KING COUNTY INTERNATIONAL AIRPORT
STRATEGIC MASTER PLAN

Airport Opportunities and Needs Assessment

WORKING DRAFT

October 18, 1996

 Internal Draft -- Distribution to Management Team, Airport Planning Team, Consultant Team

1. INTRODUCTION

This paper summarizes findings about the airport from technical papers prepared earlier in the planning process. It then uses these findings to describe opportunities, constraints and needs which, in turn, are the basis for developing detailed plan alternatives.

The data gathered for the technical papers was generated through field work, tenant and operator surveys and interviews, interviews with staff, and research to provide comparative data from the other airports.

2. FACILITY CONDITIONS

2.1 INTRODUCTION

KCIA serves as a general aviation (GA) airport and a weather alternate and GA reliever airport for Seattle-Tacoma International Airport (Sea-Tac), the region's primary air carrier airport serving 21 million passengers annually. Due to its location in the south Seattle industrial area and north Tukwila, KCIA is the region's busiest general aviation airport, handling over 422,000 personal, commercial, corporate, charter and helicopter operations in 1994. The Boeing Company is the major tenant on KCIA's 594-acre site. Boeing's complex on the airport serves as a base for their commercial manufacturing activities, including design, development, flight testing and customer delivery.

These factors require airport facilities which can support operation and storage of all sizes of aircraft, ground transportation of cargo, efficient passenger transportation and other necessary associated activities. This section describes the condition of the essential KCIA facilities and support systems, including runways and taxiways, airspace, obstructions, and various aspects of landside and ground access.

2.2 AIRSIDE FACILITIES AND CONDITIONS

2.2.1 Runways and Taxiways

2.2.1.1. Existing Conditions

King County International Airport has two parallel runways separated by 400 feet. Runway 13R-31L is 10,000 feet long and 200 feet wide. Runway 13L-31R has a length of 3,710 feet and a width of 100 feet. There is a displaced threshold of 375 feet on Runway 31R and 250 feet on Runway 13L, making the effective landing length 3,335 feet from the south and 3,460 feet from the north. Runway 13R is equipped with a precision Category I Instrument Landing System. This is used to provide a non-precision back course localizer approach to Runway 31L.

The Taxiway B runs parallel to the primary runway and is located between Runway 13R-31L and the west apron area. It is 75 feet wide, has paved shoulders, and can accommodate heavy aircraft. The Taxiway A runs parallel to the runways and is located between Runway 13L-31R and the east apron area.

The Airport has been performing systematic pavement maintenance since 1982 and began pavement non-destructive testing in 1985. In accordance with FAA guidelines, a pavement maintenance management program was prepared in 1995-6. Pavement on the airfield (and ramps) has been built in varying strengths over the years to match usage in each area. As pavements are rehabilitated and overlaid, four categories of aircraft will be maintained to match usage:

- heavy
- medium heavy
- medium
- light

2.2.1.2 Issues

Runway issues include the possible need for a new precision approach such as Global Positioning System technology (GPS) on the main runway in order to improve north flow operations; the continued need for monitoring pavement condition and need for a long term airport-wide maintenance/rehabilitation schedule; and continued standardization of pavement strength and thickness to match needs in the various areas.

2.2.2 Airspace and Air Traffic Control

2.2.2.1 Existing Conditions

King County International Airport is located within Class D Airspace while Sea-Tac International Airport is located within Class B Airspace.. These two airports are in such proximity to one another that their traffic patterns cannot be considered independently. The presence of nearby Renton Airport further complicates the picture. A large portion of the region's air traffic operating under Instrument Flight Rules (IFR) is either landing at or taking off from Sea-Tac; therefore the flow patterns in use at King County International Airport are coordinated to the extent possible by the Terminal Radar Approach Control (TRACON) facility for both airports together. The preferential traffic flow direction is to the south, occurring approximately two-thirds of the time.

In south flow, Sea-Tac IFR arrivals from the north pass directly over King County International Airport and are radar separated from King County International Airport arrivals from the north. This allows concurrent independent IFR approaches to the two airports. IFR departures to the south from both airports can also be conducted concurrently since they are on diverging courses.

In north flow, Boeing Tower provides visual separation to ensure safety both airports' arriving and departing traffic. Otherwise IFR departures to the north from Sea-Tac would have to be held on the ground until either the King County International Airport arrival had landed or visual

separation were provided when an IFR arrival to King County International Airport from the south passed over Sea-Tac.

Fast-climbing Sea-Tac IFR departures to the north are vertically separated from King County International Airport IFR departures to the north by restricting King County International Airport departures to climb to no higher than 2,000 feet. That way, Sea-Tac departures to the north cross King County International Airport above the King County International Airport departures. However, when a slow-climbing aircraft departs Sea-Tac to the north, King County International Airport IFR departures to the north are either held on the ground until the Sea-Tac departure is clear or until visual separation is provided.

Sea-Tac has had noise abatement flight tracks and procedures in place for some years, and Boeing Field, whose flights are necessarily under Sea-Tac's, has less flexibility to seek such remedies.

2.2.2.2 Issues

Airspace issues will continue to be complex for KCIA because of its central location and high volume of flight operations. This complexity will likely increase when and if a third Sea-Tac runway is constructed, whose effect on BFI operations is unknown and according to FAA, difficult if not impossible to model. Another complexity is the growing need to manage flight paths in a manner most conducive to noise containment. In general, the continued problem of being under the SEA flight patterns with little flexibility for improvements will be an ongoing issue for KCIA, requiring innovative solutions

2.2.3 Obstructions / Georgetown Steam Plant

2.2.3.1 Existing Situation

Airports in the US are protected by specific "imaginary surfaces" that FAA has designed and are standard for each type of airport. For example, at each end of the runway is a Runway Protection Zone (RPZ) into which no objects should protrude, and starting 200 feet ***(check)*** from the main runway centerline are sloping surfaces at a 7:1 angle within which no building or object should

protrude. These imaginary surfaces are described in detail in Federal Aviation Regulation (FAR) Part 77.

KCIA has a number of obstructions, particularly the hills to east and south, as well as the tall buildings of downtown Seattle. However, only one penetrates the " Part 77" imaginary surfaces around the airport. This is the Georgetown Steam Plant. Because it is so large a building, in the vicinity but not on airport-owned land, and because it has existed longer than the airport, it has been the focus of a study and its future will be a feature of the Plan.

The Georgetown Steam Plant was constructed in 1906 on a parcel of land which is at what is now the north end of the airport. It exceeds current federal height restrictions for its location and presents an obstruction to airport safety and airspace. It occupies a parcel with ramp access that could otherwise be used for airport development. Currently owned by Seattle City Light, the plant has been the subject of extensive negotiations over the years among the City of Seattle, King County airport management, and the Federal Aviation Administration. The Plant is now on the National Register of Historic Places and several other registers.

2.2.3.2 Issues

Issues represented by this plant include how to sustain its historic role in the community while still addressing its role as an airspace obstruction and potential safety hazard; the violation of height standards for its location, the cost of possible relocation of historic elements, the need for asbestos abatement,; the probable contamination of the site from PCBs and petroleum-based hydrocarbons and the cost of cleanup required for the contamination, if verified.

2.3. LANDSIDE FACILITIES AND AIRPORT LAND USE

2.3.1 Passenger Terminal Area Facilities

2.3.1.1 Existing Situation

The passenger terminal is located on the east side of King County International Airport. The facility consists of the Terminal and Arrivals areas, the terminal apron, and access and parking

facilities. The Terminal Building is a two-story structure originally constructed in 1928 which has undergone considerable renovation over the years. The original air carrier passenger handling function has been largely replaced by other uses. The ground level of the terminal consists of a central lobby with ticketing counter, passenger waiting area and boarding gates, deli/espresso stand with accompanying tables and chairs, and office space. The primary user of the passenger terminal area is West Isle Air.

The Terminal Building's upper floor consists of office space around and beyond a central mezzanine overlooking the lobby. Most upper floor office space is occupied a small market research and engineering firm performing contract work for Boeing and others. Aviation related businesses occupy the remaining areas. The building includes a partial basement as well as the cab and office for the former air traffic control tower. The Terminal Building is scheduled to be renovated in 1996-7 with improvements in air conditioning, a new elevator, upgrading of electrical and utility services, and cosmetic improvements. Many passengers do not use the terminal area at all; diverted airline passengers are bussed directly from the ramp area and charter or corporate passengers access the airfield via the FBOs.

South of and connected to the Terminal Building is the Arrivals Building constructed in 1978, in anticipation of a major passenger charter market. It provides additional waiting areas, access to the concourse, and eight boarding gates. The first floor has a large baggage handling area and station for U.S. Customs and Immigration. A restaurant was located on the second floor for many years. The restaurant has since closed and the area, as well as the baggage handling area may be reserved for use by public and private agencies and individuals. The terminal apron is marked with four parking spaces for large jet aircraft and can accommodate additional aircraft with closer parking during peak demand periods when all eight gates are occupied. Other King County owned buildings in the terminal area are the North Annex (housing Airport Administration offices, King County Safety and Workmen's Compensation, Aviation Insurance Company, and several small businesses) and the 7300 Building, which is currently vacant with plans for renovation to accommodate the County's Emergency Management Office and other agencies.

2.3.1.2. Issues

Issues for the terminal area are numerous including the need for a decision how to use the Arrivals Building site and whether to replace it with another use /facility; the need to make fuller and more attractive use of the Old Terminal (the 1928 portion); the need to ensure that scarce rampside space is used by customers who need ramp access. Another concern is to make fullest possible use of sites with less height restrictions in this widest, portion of the whole airport. There is a need to create and maintain a welcoming "gateway" through aesthetic and other changes. This includes the need to address creating and sustaining an appropriate level and variety of food service.

Finally, there is a need to create a policy and mechanism to support community needs and interests without generating a problem of diversion of aviation funds to non-aviation uses banned by FAA.

2.3.2 Surface Access and Parking

2.3.2.1 Existing Conditions

Terminal access and parking are provided by a three-lane, one-way access loop extending from Perimeter Road to the Terminal Building. The loop surrounds the central auto parking lot and ties into Perimeter Road South. and Airport Way South. Perimeter Road, connected to Airport Way South by four separate entrances, provides surface access to and from all facilities on the east side; East Marginal Way South provides access to and from all facilities on the west side; and South Warsaw, South Myrtle, and South Willow Streets provide access to facilities from Ellis Avenue South. In the vicinity of the Terminal Building, there are six main parking lots; additional parking is available throughout the airport. As activity grows on the east side, parking for employees is starting to become a critical issue.

2.3.2.2. Issues

The main issue for the terminal parking area is the need for better circulation and parking layout as well as signage in the entire terminal area. Elsewhere on the field the issues are

increased truck access and its impact on pavements, turning radii, plantings etc.; leading to the probable need to designate truck routes; and traffic speed.

2.3.3 Airport Perimeter

2.3.3.1 Existing Conditions

The Airport has expanded over the years and now occupies virtually all of the land bounded by six roads – Airport Way, South Norfolk Street, East Marginal Way, Ellis Avenue, South Hardy and 13th Street. The airside property is for the most part enclosed within a perimeter fence with card-controlled entry gates in key locations. The main section without such control is the north T-hangar area where some hangars lie across Perimeter Road which thus cannot currently be fenced off. Various other locations are only partially controlled, especially during daytime when gates are often left open or unattended. Boeing's perimeter security is of the highest standard, with fencing, staffed gates and roving patrols. The Airport police conduct roving patrols of the entire perimeter.

The Airport has recently been active in upgrading airport address signs to a higher legibility, making it quicker and easier to find the right address

2.3.3.2 Issues

Issues in this zone relate to the management of access gates and security, including who is authorized to gain access and how codes are managed; the completeness and impenetrability of perimeter fencing; and interface with Boeing on access and security issues. Also, continued improvements to building signage are an important issue for security and safety reasons.

2.3.4 Air Cargo Facilities

2.3.4.1 Existing Conditions

Air cargo operations are all located on the east side of the airport, south of the Terminal Building. These include United Parcel Service (UPS), Federal Express, Alaska Airlines Cargo, Burlington Air Express, Airborne Express, Regional Express, Mountain High Aviation, and others. UPS

aircraft routinely use Gate 7 of the Terminal ramp and Airborne Express leases public ramp space on a space-available basis. Federal Express moved their flight operations to Sea-Tac Airport but continue to lease some space for use as a sorting facility. A new Burlington Air Express facility was recently completed.

2.3.4.2 Issues

The Burlington facility is the only recent all-cargo leasehold on the field; other operators are in subleased space and /or using the public ramp. An issue is how to accommodate them adequately as demand grows. Related issues include:

- Truck traffic impacts
- Trucks on ramp – security, safety
- Peaking situation and associated ramp space demands e.g. at Christmas
- Intensity of use of public ramp, and related "bumping" procedures
- Ground facilities for transient cargo operators
- Pavement damage from ground equipment used in loading cargo

2.3.5 General Aviation Facilities

2.3.5.1 Existing Conditions

General aviation facilities are provided by King County and FBOs on multiple sites on both sides of the airport. County facilities consist of 73 individual aircraft hangars and 147 open aircraft tie-downs. At the time that this report was written, the waiting list for hangars was 95 aircraft while tie-downs experienced a 25 percent vacancy rate. Transient aircraft parking is provided by the County at Gate 1 of the Terminal ramp.

Two full-service FBOs, Flight Center and Galvin Flying Service, provide a range of general aviation services on leased sites, including tiedowns and hangar spaces. Services include based and transient aircraft parking, fueling, maintenance, rentals, sales, flight instruction, and charters. Two corporate aviation operators, Nordstrom and McCaw Cellular, maintain their own facilities on leased sites located on the east side.

2.3.5.2 Issues

Issues of the general aviation area include:

- Provision of self-service avgas pumps
- Review of best management arrangement for County-owned spaces
- Fostering continued choice / competition in FBO services

2.3.6 Support Facilities

2.3.6.1 Existing Conditions

Police and Aircraft Rescue and Fire Fighting (ARFF) services at King County International Airport are provided by King County through dual-trained police/fire officers. The Police/ARFF facility is located on the west side of the airport. The airport also has Mutual Aid Agreements with the Seattle Fire Department, the City of Tukwila, and the Boeing Company. Maintenance facilities, consisting of office space, shop areas for paint, carpentry, plumbing, and electrical services, and parts and auto shop equipment storage, are located in the northwest corner of the Airport.

The County is responsible for some tenant maintenance in addition to support of airport operations. This includes maintenance of the airfield grounds, buildings, roads, and vehicles. Fuel facilities are located at the north end of the airport. The fueling station is owned by Aviation Fuel Associates, which leases storage in the underground tanks to the FBOs. Other fuel facilities located at the Airport are owned by Aerocopters, Nordstrom, Flight Center, and the Boeing Company. FAA facilities located at the airport include the Air Traffic Control Tower and the Automated Flight Service Station (AFSS or FSS). The Control Tower is located on the west side adjacent to the ARFF facility. The FSS is located at the north end of the Airport.

The Airport is inspected annually by FAA for compliance with FAR Part 139 and has generally been found to be in excellent condition in all respects considered by the regulation.

2.3.6.2 Issues

Issues in this area include the need to meet future security regulations based on forthcoming new legislation; the possible need for greater fuel storage capacity as larger aircraft operations, using more fuel per flight, grow; the need for a consistent and clear policy on airport tenant ramp maintenance and associated fees; and the need for a facilities maintenance plan and associated financing. A related issue is that the airport maintenance shop has been very successful in acquiring federal surplus equipment; however, it needs to be depreciated as if new in order to provide an adequate replacement fund if surplus equipment cannot be found in the future.

2.3.7 Airport-Owned Buildings (TO BE ADDED.)

2.4 Airport Land Use and Property Utilization

2.4.1 Existing Conditions

About half the airport is in use as airfield operations areas (runways, taxiways, navigational aid sites, and on-airport roads ***(check).*** The other half, about 300 acres is leased sites and public buildings / ramps. This means the landside area is very limited in relation to the scale of the airport; for example Bremerton International Airport has about 3,000 acres; and Scottsdale, AZ which is a GA airport with only 170,000 annual operations, has over 2,200 acres.

Exhibit 1: TO BE ADDED

Except for relatively small areas occupied by the Washington State Division of Aviation, the Airpark Hangars Apron, and the Museum of Flight (which is not on airport land), most of the apron area on the west side of the airfield is occupied by the Boeing Company. On the east side of the airfield and north of the terminal building, most of the apron area is occupied by FBOs and general aviation operators. Directly south of the terminal building is the Boeing EMF site, which recently underwent demolition and is awaiting the outcome of this Plan to define its future use. The area south of that is occupied by general aviation and air cargo. Airfield access at King County International Airport is provided by a combination of service roads, taxiway shoulders, and ramp area drive lanes.

Since King County International Airport has a very constrained land area for the operations it supports (15th to 20th busiest airport in the US, in terms of operations), therefore the scarce property available must be utilized as effectively as possible. Of the airport's 594 acres, all are in use as public space or leaseholds. Some space is underutilized and could be occupied more intensely. The largest vacant property is the Boeing EMF building.

The 1980s saw a flattening or decline in general aviation activities both nationally and at KCIA, and at the field, a reduction in the number of airport businesses. During that period, many properties were vacant or underutilized. The mid-1990s, however, saw substantial growth so that the airport's primary property utilization problem is no longer how to fill vacant space, but rather, how to allocate scarce space resources in the best manner..

Vacant or underutilized property at the Airport falls into the following categories:

1. Rented space that is unused by the tenant or only slightly used;
2. Property unavailable for rent because of height restrictions;
3. Property that is within the roads bounding the airfield but does not belong to King County.

Rented space that is underutilized has been addressed in a number of ways. For example, as approved in the 1986 Plan, the Airport is designing the realignment of Perimeter Road on the northeast side of King County International Airport, removing 1940s era hangars and utility buildings, and redeveloping adjacent areas where possible aviation tenants, displaced by removal of the older buildings, will be relocated to upgraded new buildings appropriate to their needs. Currently underway are remodeling and upgrading of vacant space in buildings to be leased by County agencies, displaced tenants noted above, or other, in 1996 (7300 Building and Ellis Avenue Building).

Space was leased in the Terminal Building and operating agreements were negotiated with two scheduled airline operators for flights to the San Juans and other tourist attractions in the area

(West Isle Air and, during 1995, Scenic Air). Space was leased in the Terminal Building for a small coffee/sandwich operation which opened in November 1995 and will provide a much-needed service to tenants on the east side of KCIA (Cavu Cafe).

After negotiating environmental and financial safeguards, a sublease of the leased but unused old Howard Aviation site was encouraged which resulted in higher utilization of two properties, the Howard site and the adjacent public ramp. Interruptible use arrangements were negotiated in public ramp areas that encouraged higher utilization by private operators while retaining flexibility for public use.

The Airport has embarked upon actively marketing underutilized public space to community and government groups (including the Metropolitan King County Council, weddings and other functions and the Red Cross). This has been done in order to increase use, make the Airport an even better asset to the community, and improve the visibility of the Airport and aviation economic activities to all citizens. More is planned in this regard.

The Airport has invested funds to restore and refurbish the Terminal Building. The first phase should be completed in March 1997. A second phase is in the program planning stages to improve the appearance of the building (i.e., restoring it to a near original appearance and adding amenities such as a public airport observation). Also, classrooms, meeting areas, and other improvements for the benefit of airport users, the neighboring community and general public will be developed for rental.

In the case of property with limited potential because of height restrictions, consideration is being given to an area in the south Runway Protection Zone (RPZ) as a site for a sewage holding tank requiring about 4 acres of land. In the north RPZ, a plant nursery leases most of the space and the remainder has been planted with spring flowers.

Property beyond the airport boundaries is limited in scale; several sites are being appraised and discussed with owners.

2.4.1.2 Issues

The main issues for the layout of airport land uses are lack of land to accommodate burgeoning needs; some property being inefficiently or under-utilized; non-aviation uses occupying scarce ramp-access land; and juxtaposition of buildings and uses in fairly random manner throughout the field.

Issues around space utilization may be summed up as how to use space more fully. This applies both to private leased spaces in some instances, and also to public spaces such as the terminal; how to write different leases as each parcel's lease expires, to ensure more flexibility for both lessor and lessee if conditions change during the term of the lease.

Another issue is how to find mechanisms to require tenants to fully use their space rather than just land-banking it; and how to ensure highest and best use of all parcels, but especially those with ramp / airfield access.

2.6 UTILITIES

2.6.1 Existing Conditions

Water is provided to the Airport by the City of Seattle and the City of Tukwila Water Departments through mains located under E. Marginal Way South and South Hardy Street. Within the Airport property boundaries, all water lines are owned and maintained by the Airport. The original water system was installed in the 1940's and since that time the system has been expanded to meet the Airport's needs. KCIA supplies water to tenants and bills tenants for the service. Low flow water conditions affecting fire protection capability existed in the past between the terminal Buildings and the south terminus of Perimeter Road but have been resolved as Tukwila recently increased pressure. Each new building project reviews waste flow adequacy. Additionally, a 1940's vintage water lines lie beneath the main runway and their condition has not been investigated in recent times.

Sewer service is provided by the City of Seattle Drainage and Wastewater Utility. There are no sewer capacity problems; planned improvements include the separation of combined storm and further sanitary sewer systems.

Surface water from all buildings, paved areas, airfield grass, and landscape areas is collected by storm drain pipes owned and maintained by the Airport. Surface water from off-site tributary areas is also collected by the Airport. Drainage generally flows from east to west and is routed to either the southwest or northwest pump station located near East Marginal Way. Pumps discharge surface water to the Duwamish River. Some gravity flow pipes also carry storm water to the Duwamish River. The Airport maintains 13 oil/water separators for surface water quality purposes.

Power to the Airport is provided through overhead and underground lines by Seattle City Light; natural gas is provided by Washington Natural Gas and is used extensively for heat throughout the Airport. Telephone service is provided by U.S. West Communications. The Airport installed a fiber optic system in 1980 to allow for closed circuit television monitoring by Airport police. The system has recently been expanded to link the computer systems of Airport administration, maintenance, and ARFF support services. Not all facilities have backup generator systems.

2.6.2 Issues

Issues relating to utilities include the need to address low flow water conditions between the Terminal Building and the south terminus of Perimeter Road; and replacement of the aging water supply line located beneath the main runway.

Ensuring electrical service to key facilities in the case of emergencies e.g. backup generators is a need that should be addressed; in general, replacing or rebuilding old utilities before they cause a problem should be a focus of the Plan; utilizing an ongoing program for utilities inspection and replacement based on predicted life of each item, that needs to be developed. Another issue is coordination with utility providers. There should be a process to identify new tenant needs such

as more power, fiber optics hookups; and more coordination needs to take place with Boeing on storm drainage issues (see also environmental section)

3. AVIATION ACTIVITY

3.1 INTRODUCTION

Aviation activity at a specific airport is influenced by a variety of factors, including population, economic conditions such as disposable income, demand for time sensitive delivery of goods, and airport facilities and pricing.

Over the last ten years, the region's population has grown by 22 per cent and employment has increased 32 per cent. Although King County's share of the region's jobs has declined in that same period has the other counties have grown, it still holds the largest share, over 55 per cent. However, King County experienced the largest growth in per capita income in the region, at 59 per cent over the last ten years in 1995 dollars.

During the same ten year period, KCIA's operations have fluctuated around the same high level, as shown in Exhibit 2 below.

Exhibit 2

Historical Aviation Activity at King County International Airport

Year	General Aviation	Air Carrier	Military	Total	No. of Instrument Operations	%
1985	363,772	19,092	2,526	385,390	52,910	13.7%
1986	381,852	19,949	2,939	404,740	59,111	14.6%
1987	354,513	20,074	2,774	377,361	57,850	15.3%
1988	382,306	26,765	2,742	411,813	64,146	15.6%
1989	383,876	27,385	3,094	414,355	63,655	15.4%
1990	374,292	24,670	4,187	403,149	58,152	14.4%
1991	349,510	29,576	3,777	382,863	54,631	14.3%
1992	370,693	34,102	4,274	409,069	51,812	12.7%
1993	323,401	36,910	3,012	363,323	51,480	14.2%
1994	377,450	42,278	3,076	422,804	52,317	12.4%

Source: Air Traffic Control Tower, King County International Airport, 1995

As portrayed in Exhibit 2, general aviation activity has remained relatively constant; air carrier activity has doubled, although it remains at or under 10 per cent of total activity; and military activity has remained constant and under 1 per cent of the airport's operations. Instrument operations have remained constant around a norm of 12-15% of total operations.

To determine the opportunities and needs for KCIA's future, it is important to project the quantity and types of aircraft demands which could be placed on the airport. To analyze these future demands, eight market segments were identified and considered. They are:

1. Personal Use GA (aircraft under 12,500 lb.): used for private, leisure, and recreational flying.
2. Business GA (aircraft under 12,500 lb.):used for business purposes.
3. Corporate GA (aircraft over 12,500 lb.): used by corporate and business users.
4. Aviation Business (FBOs): charters, flight instruction, fueling, maintenance and other services.
5. Air Cargo: all-cargo operators using small aircraft (Part 135 and large aircraft (Part 121).
6. Aerospace Production, Test and Delivery: Boeing Company activity related to the production, flight testing, and delivery of new aircraft.
7. Military: activity by local military installations such as McChord Air Force Base, Whidbey Island Naval Air Station, air shows, and repairs and retrofits to military aircraft by the Boeing Company.
8. Passenger Activity: non-scheduled charters and weather diversions that operate at Boeing Field.

The following sections describe each segment, its historic activity, previous Master Plan projections and factors affecting the future growth of that segment.

3.2 GENERAL AVIATION [MARKET SEGMENTS 1-4]

3.2.1 Description

General aviation is a comprehensive term describing all civil aviation activity that is unscheduled. Nationally it includes all the activities shown in Exhibit 3 Based Aircraft at King County International Airport and encompasses many activities performed while airborne (e.g. Traffic spotting, banner towing) as well as being a mode of transportation.

At KCIA, helicopters and large corporate aircraft are important components of the GA segment, although numerically, small private planes are predominant, as they have been since the airport opened.

3.2.2 Historical Activity

GA activity, covering market segments 1-4, has decreased from 94% to 89% of total annual operations between 1985 and 1994. During that same period, based aircraft at King County International Airport have decreased by 17%, with decreases in single-engine piston-powered aircraft (19%), multi-engine piston-powered aircraft (22%), and turbojet aircraft (12%).

Rotorcraft / helicopters however, have increased 48%. The airport's important roles in medical evacuation, police, media, traffic, and other applications have contributed to the increase of based rotorcraft (helicopter) and rotorcraft activity at King County International Airport. Based aircraft, by aircraft type, at King County International Airport for 1985 through 1994 are presented in Exhibit 3.

The aircraft categories included in the table are the same as those used by the FAA (single-engine piston prop, multi-engine piston prop, turbojet, helicopter, military, and seaplane). While these categories do not provide the usage or market detail that is the focus of the current study, they are the best available for historic data and thus became the basis for the numerical portions of the market analysis and forecasts.

Exhibit 3

Based Aircraft at King County International Airport

Year	Single-Engine*	Multi-Engine*	Turbo-jet	Helicopter	Military	Seaplane	Total
1985	361	134	43	21	0	0	559
1986	361	134	43	21	0	0	559
1987	312	156	49	26	0	0	543
1988	303	186	57	26	0	0	572
1989	335	127	39	31	1	0	533
1990	331	122	37	30	1	0	521
1991	371	108	33	34	2	0	548
1992	336	124	40	36	1	0	537
1993	290	117	47	28	0	0	482
1994	293	104	38	31	0	0	466

Source: King County International Airport, 1995

* Jets included in single-engine and multi-engine numbers.

3.2.3 Previous Master Plan Forecasts

The previous Master Plan anticipated significantly greater numbers of based aircraft than have actually occurred. Projections shown in Exhibit 4 are greater than actual numbers of based aircraft as shown in Exhibit 3:

Exhibit 4

1986 Master Plan Based Aircraft Forecasts

	Single-engine	Multi-engine	Turbo-jet	Helicopter	TOTAL
1984 actual	361	134	43	21	559
1990	370	144	63	26	603
1993	379	159	84	32	654
2003	400	194	150	47	791

Reasons for this less robust growth appear to relate simply to the national downturn in GA during the 1980s.

3.2.4 Present-Day Situation

To better understand why and how aircraft owners use the airport and how the airport can better meet their needs, surveys were distributed to over 300 owners of aircraft based at King County International Airport. Results of the surveys were used to determine a breakdown of based aircraft for each of the 8 market segments. The based aircraft by market segment are presented as Exhibit 5.

Exhibit 5

1994 Based Aircraft by Aviation Market Segment

Aviation Market Segment	1994 Distribution Number of Based Aircraft[1,2]	1994 Distribution Percent of Airport Total
General Aviation		
Aircraft under 12,500 lb. - Personal Use	234	50
Aircraft under 12,500 lb. - Business	97	21
Business and Corporate Aircraft over 12,500 lb.	86	18
Aviation Business (FBOs)	19	4
General Aviation Subtotal	**436**	**93**
Air Cargo		
Aircraft under 12,500 lb.	18	4
Aircraft over 12,500 lb.	8	2
Air Cargo Subtotal	**26**	**6**
Aerospace Production, Flight Test, and Delivery	**4**	**1**
Military	**0**	**0**
Passenger Airlines[3]	**0**	**0**
Airport Total	**466**	**100**

Source: 1) General 1994 numbers were obtained from King County International Airport.
2) Market splits based on KCIA tenant survey results, 1995.
3)Passenger airlines (charters) currently base their aircraft elsewhere.

While FBO's represent only 4% of the based aircraft fleet, they play a disproportionately larger role in the Airport's well-being. The Airport has two full-service FBO's and several other operators. Activity is ample on the field to continue to support diversity in this segment since an industry rule of thumb is a growth of 1 million gallons of fuel per year is a threshold for a new FBO and KCIA handles 10-12 million gallons per year.

3.2.5 Factors Affecting GA Activity

From about 1978 to recent times, general aviation as a whole declined in almost every aspect, both locally and nationally, although the Pacific Northwest region has not been impacted quite as much as some other regions. Within the GA total, the impact has been mainly in the smaller aircraft categories. GA turboprop, jet and rotorcraft activity has been increasing rapidly and these sub-categories are becoming a larger percentage of the total.

There has been much debate and analysis by FAA and others about the reasons for the decline of small aircraft ownership, and many of the conclusions are speculative. Reasons given by FAA in their national airport forecasts, and by officials of the American Association of Airport Executives for this include at least the following:

- Cost of ownership, including fuel, insurance, purchase price
- Diminishing production of US small aircraft resulting in reduced consumer choice.
- Insurance availability to the pilot
- Airline deregulation and related growth in air service to some smaller points, reducing the role played by general aviation in certain markets
- Lack of a steady flow of military-trained pilots
- Elimination of the GI Bill veterans' benefits that paid for flight instruction beyond the private pilot level
- Increased Airspace restrictions in most urban areas as airline traffic has grown
- Less leisure time on the part of the average American professional who would be affluent enough to own a plane
- Availability of other affordable recreational equipment. (e.g. RVs, sailboats, snowmobiles, jet skis) that were not previously on the market.

In recent times this long downward trend appears to be reversing, due to developments that have been noted by FAA, local pilots, and trade publications. These developments include:

- Adoption of product liability legislation limiting liability claims against manufacturers of small aircraft to 18 years, thus vastly reducing lawsuits for wrongful death or injury and ultimately reducing the insurance cost per aircraft manufactured and thus the cost of buying a new plane;
- Streamlining of the process of certification for new small aircraft
- Repeal of aircraft luxury tax in 1993
- New production of small aircraft resulting in more consumer choices
- Growth in mergers and acquisitions resulting in greater use of corporate aircraft;
- Rotorcraft usage continues to grow because of speed and flexibility.
- Growth in renters and flying clubs continues, developing a stream of qualified pilots despite the reduction in military and GI training
- Strong interest in homebuilts and experimental aircraft, strengthening the lowest end of the market and creating a potential customer group for upgrades in equipment.

3.2.6 Future Projections

Though the outlook for general aviation in the 1980s and early 1990s was not promising, the future for GA looks more promising for all sectors. General aviation is likely to increase, with the largest increases occurring in the aircraft over 12,500# -- the high end of the GA market represented by the corporate sector. With the increases in activity projected for the Asian market, According to recent articles in Business and Commercial Aviation[1],[2] Seattle is a good stopping point for corporate aircraft before embarking on the transoceanic flight to points in Asia and the Pacific Rim, resulting in increased business for the FBOs at King County International Airport.

3.3 AIR CARGO (MARKET SEGMENT 5)

3.3.1 Description

Cargo activity at KCIA occurs with planes dedicated to cargo, rather than using belly hold space in passenger aircraft (as generally occurs at scheduled passenger airports). They vary from large (DC-8s, 737s) to small single engine aircraft. Many of the smaller aircraft operate as feeders to the larger ones. Some are certificated under FAR Part 121 as Air Carriers, and others are under Part 135 as air taxi operators. Some operators are known as *Integrators,* and may be domestic or international such as UPS, Federal Express, Airborne, DHL, etc. They use airports for regional hub operations connecting to a regional trucking hub that may serve more than one airport.

Other all-cargo operators may offer just air transport without the door-to-door aspect offered by integrators. Additionally, specialized services such as mail order catalogs, canceled checks, etc., are an important service working just with businesses, performed by some of the current King County International Airport cargo operators.

3.3.2 Historical Activity

Exhibit 6 summarizes historical air cargo activity at King County International Airport since 1988. Tonnage data, a common measure of activity, is published by the cargo industry. Measuring the tonnage per operation may provide perspective on the potential size of aircraft carrying the cargo and/or the type of cargo. However, the trend to larger aircraft was not foreseen. Getting the equipment size correct for future years is particularly important later in the planning process when forecasting air cargo tonnage, fleet mix, and operations.

Exhibit 6

King County International Airport Cargo Tonnage and Operations - Historical

Year	Cargo Tonnage	% Change	Cargo Operations	% Change	Tons/Operation (average)
1988	25,230	--	*TBD*	--	*TBD*
1989	27,530	9.1%	*TBD*	*TBD*	*TBD*
1990	24,525	-12.3%	11,192	*TBD*	2.19
1991	26,328	7.4%	11,788	5.3%	2.23
1992	28,014	6.4%	13,514	14.6%	2.07
1993	31,031	10.7%	15,694	16.1%	1.98
1994	40,085	29.2%	16,386	4.4%	2.45

Source: King County International Airport Records

Note: 1994 rankings of airports by total air cargo volume showed King County International Airport as no. 73 with 36,338 cargo tonnes (40,085 US tons) and SEA as no. 18 with 415,141 cargo tonnes (458,000 US tons).

For growth rate comparison, Exhibit 7 reflects the historical growth in freight and express revenue ton miles published by the Air Transport Association (ATA). The national growth shown here is representative of activity in the cargo industry. It may be concluded that Boeing Field's cargo activity is growing much faster than the national average; a look at 1995-6 data (not shown here) confirms this, as the rate of increase continues to accelerate.

Exhibit 7

National Freight and Express Revenue Ton Miles

Year	Cargo Tonnage (000)	Growth
1988	9,632,219	
1989	10,275,002	6.67%
1990	10,546,329	2.64%
1991	10,225,199	-3.04%
1992	11,129,712	8.85%
1993	11,943,595	7.31%
1994	13,720,625	14.88%

Source: Air Transport Association

3.3.3 Previous Master Plan Forecasts

According to the previous King County International Airport Master Plan, 80% of freight tonnage in 1984 was being carried by heavy jets (727 type) while contributing only 7% of the operations. It was assumed by the previous Master Plan that this trend would continue. This assumption led to a mis-reading of the number of cargo operations, which have remained small despite a larger than predicted growth in tonnage, as shown in Exhibit 8. Actual 1994 air cargo operations were less than half of the forecast, totaling 16,386 operations. Master Airport's Actual 1994 tonnage was nearly four times the 1995 forecast for a total of 40,085 tons.

Exhibit 8

1986 Master Plan Cargo Forecasts

YEAR	TONS	OPERATIONS	TONS/OP
1990	7,065	25,000	0.283
1995	10,140	37,000	0.274
2005	14,560	53,000	0.275

Source: 1986 Airport Master Plan

This increase in tonnage carried in larger aircraft was unforeseen but can be expected to continue, because as payloads become larger, carriers will typically use the largest aircraft they can fill, since one of the most expensive operating cost item is generally pilot labor and the operator will seek economies of scale.

3.3.4 Present-Day Situation

Total air cargo operations have grown to nearly 16,400 annually and tonnage to 40,000 for an average of 2.43 tons per operation or about 8 times the 1986 prediction. Air cargo activity at King County International Airport in the last five years has been handled by more than twenty operators. They operate one or more aircraft from a Cessna 172 to a Boeing 727. Exhibit 9 represents the air cargo operators which reported activity for 1994. Additional operators included below, such as Airborne Express and Alaska Airlines, began activity in 1995.

Without exception, the nation's all-cargo express and small package operators use hub systems. For example, Federal Express was the first, and built a hub in Memphis. UPS's main hub is at Louisville, and Airborne's at Wilmington, OH. Trucks collect material from customers all over town throughout the day, culminating in later afternoon delivery to the airport or sorting center. Items are packaged into "igloos" or aircraft containers, and loaded. In the early evening, flights take off to the hub, By late night or early morning, all the flights have arrived from all over the

country and a complex sorting operation begins. In the small hours of the morning the aircraft are reloaded, in the King County International Airport's case with materials bound for the Northwest, and the flights arrive starting at about 5 AM so that trucks can make guaranteed deliveries to urban customers by 10 AM.

In addition to the truck feeders, some small cargo operators also fly material directly to the ramp, serving as feeders to the larger carriers. Thus the entire system is interdependent and schedules are dependent on national system needs.

Exhibit 9

Current King County International Airport Air Cargo Operators

Operator	Total 1994 Operations	Remarks
Aeronautical Services	34	
Aeroflight Executive Services	1,992	
Airborne Express	0	Initiated service in 1995
Airpac Airlines	4,160	
Alaska Airlines	0	Initiated service in 1995
Ameriflight	6,042	
Burlington Air Express	220	Initiated regular service in 1995 although had served BFI periodically in previous years
FedEx	0	Max 10 ops/yr.
Methow Aviation	400	
Mid-Atlantic Freight, Inc.	0	Active in 1994 and early 1995
Mountain High Aviation	72	Higher activity in 1993 and early 1995
Regional Express -	664	
UPS	2,500	
U.S. Check	302	

Source: King County International Airport Records

3.3.5 Factors Affecting Growth

Due to deregulation and other factors such as the increase in integrated carrier companies and the high demand for next day delivery, air cargo is rapidly becoming the fastest growing cargo

mode.[3] Because of the size of the market, the Pacific Rim countries are the fastest-growing cargo markets. These factors combine to make King County International Airport a point of great interest to present and future cargo operators in a manner that was not evident in the 1980s.

As described throughout this section, historical cargo activity and current trends indicate that the industry will continue to experience positive growth, a portion of which can be tapped by King County International Airport This offers King County International Airport with numerous opportunities to consider, including integrated carriers, other national and international large operators, and small operators similar to those on the field at present.

3.3.6 Future Projections

Factors on which King County International Airport may continue to capitalize include increasing congestion at SEA with its associated reductions in operational delays, its greater number of fog-bound mornings and other weather differences[4], and King County International Airport's close proximity to downtown and developed industrial areas. The bottom line for the air cargo market is that there is a significant level of growth opportunity, possibly more so than other aviation markets, which King County International Airport could pursue, including the possibility of international cargo.

Several constraints important to King County International Airport's possible pursuit of a specific cargo role include space availability, limited opportunities to complement off-airport operations by sorting centers and warehouses, the need for satisfactory mitigation of environmental impacts such as noise, and greater airport access and circulation requirements to address truck traffic. On the other hand the benefits could be great in terms of economic impact to the community (i.e. jobs), especially presenting an opportunity to create jobs for residents of the immediate neighborhoods.

3.4 AEROSPACE PRODUCTION, FLIGHT TEST, AND DELIVERY (MARKET SEGMENT 6)

3.4.1 Description

B737s and B757s are manufactured at Boeing's Renton plant and engine run-ups are performed at Renton Airport. The airplane is then flown to King County International Airport, where it typically undergoes three test flights, successively with Boeing crew, FAA and customer crew. The fourth flight will typically consists of a takeoff with an all-customer crew, referred to as the delivery flight.

B747s, B767s, and B777s are delivered to the customer from Paine Field, unless the customer has special requests for the aircraft. In such a case, the airplane is flown to King County International Airport, where it is completed and undergoes the test flights discussed above.

3.4.2 Historical Activity

The Boeing Company, headquartered in Seattle, is not only the largest tenant at King County International Airport, but also one of the largest employers in the region. Therefore is important to understand the aerospace market and how it will affect future aerospace production, flight tests, and deliveries at Boeing and, ultimately, how it will affect King County International Airport.

Data representing the number of Boeing aircraft deliveries from King County International Airport, total number of Boeing aircraft deliveries worldwide, and total world market for airline-class aircraft was collected for the ten-year period from 1985 to 1994 and is presented in Exhibit 10.

Exhibit 10

Boeing Company Aircraft Deliveries from King County International Airport

Year	No. of Boeing Aircraft Deliveries from KCIA	Total number of Boeing Aircraft Deliveries	Total World Market
1985	NA	203	360
1986	NA	242	409
1987	193	270	434
1988	203	290	513
1989	206	284	568
1990	252	385	675
1991	296	435	844
1992	310	446	793
1993	213	330	651
1994	179	271	522

Source: Boeing Company Flight Operations, 1995

An eight-year (1987-1994) average of Boeing Company aircraft deliveries yields 232 annual airplane deliveries from King County International Airport. Over these ten years, the Boeing Company's share of the total world aerospace market has ranged from a low of 50% in 1989 to a high of 62% in 1987, averaging at 55%. It is important to note that this represents the Boeing Company's share of the market in terms of aircraft units sold, rather than their share of the total dollars spent on new aircraft. In terms of dollars spent on aircraft orders, the Boeing Company's share is closer to 60%. Comparison of aircraft deliveries from King County International Airport with the total number of aircraft delivered by the Boeing Company yields King County International Airport's market share of aircraft deliveries in a range of 64% to 73%, averaging at 68%.

3.4.3 Previous Master Plan Forecasts

The previous Master Plan did not specifically examine Boeing activity and growth.

3.4.4 Present-Day Situation

Aerospace activity at King County International Airport consists of aerospace production, flight test, and delivery. B737s and B757s are manufactured at Boeing's Renton plant and undergo testing, certification, and delivery at King County International Airport. B747s, B767s, and B777s are manufactured at Boeing's Everett plant and are usually delivered from Paine Field, except in cases where they are retrofitted with special electronics equipment, which occurs at King County International Airport.

The Boeing Company has facilities at King County International Airport, Paine Field in Everett, and at Renton Airport for the manufacture, testing, certification, and delivery of their airplanes. The majority of Boeing's flights at King County International Airport are test flights. However, deliveries to customers of B737s and B757s are usually made from King County International Airport, whereas deliveries of B747s, B767s, and B777s are usually made from Paine Field.

3.4.5 Factors Affecting Growth

World economic growth and world passenger growth is expected over the next 20 years to the extent that world passenger traffic is expected to double by 2007 and nearly triple by 2014. The three major aircraft manufacturers, Boeing, McDonnell Douglas, and Airbus, project requirements of approximately 15,000 new aircraft over the next 20 years in order to meet the passenger demand.

3.4.6 Future Projections

Boeing's goal is to capture 60% to 65% of the aerospace market in the forecast period. In addition, over the past 10 years, King County International Airport has delivered 68% of total Boeing deliveries. Boeing still has 35 years remaining on their 75-year lease at King County

International Airport. Consequently, in order to meet future demand, they will continue use of their leased land at King County International Airport.

Company officials have indicated that their existing leasehold will be sufficient and that they expect to use both it, and the non-County owned aerospace property to the south, more intensively, including an expansion of the flight line. Over the years Boeing's total flight operations have been about 3% of flights, and so even an expansion of flight operations will not significantly affect total operations.

3.5 MILITARY (MARKET SEGMENT 7)

3.5.1 Description

Military activity at KCIA is often associated with Boeing military aircraft making service calls. Military flights may also include Whidbey Island and McChord planes calling in to pick up reporting troops (e.g. Air National Guard on reserve duty) as well as more conspicuous events such as the arrival of Air Force One with the President on board. Military activity is primarily itinerant with military flights to Boeing's aerospace facilities for repairs and maintenance making up the majority of the local operations and a portion of the itinerant flights. Other itinerant operators include air show performers in the summertime, National Guard and Reserve Units on the weekends and occasionally during the week, aircraft from McChord Air Force Base using the wash pad for anti-corrosion procedures, and other active duty units conducting training (i.e. touch-and- gos).

3.5.2 Historical Activity

Military aircraft operations have averaged approximately 3,200 total annual operations for the last ten years. According to Air Traffic Control Tower personnel, the highest level of itinerant military operations occur in the summer during preparation for and during the annual air show. Many of the air show participants practice maneuvers several days prior to the air show. Favorable weather conditions also invite increased military training activity. Exhibit 11

summarizes the annual activity levels for King County International Airport's military segment for the last ten years.

Exhibit 11

Historical Military Aircraft Operations

Year	Itinerant	Local	Total
1985	2,146	380	2,526
1986	2,351	588	2,939
1987	2,098	676	2,774
1988	2,130	612	2,742
1989	2,310	784	3,094
1990	3,451	736	4,187
1991	2,175	1,602	3,777
1992	3,176	1,098	4,274
1993	2,078	934	3,012
1994	2,291	785	3,076

Source: King County International Airport

3.5.3 Previous Master Plan Forecasts

The 1986 Master Plan did not specifically identify military forecasts other than to indicate they would stabilize at .5% of total operations.

3.5.4 Factors Affecting Change

Although military missions change in response to national and world events, recent history has shown that military activity around the country is stabilizing.

3.5.5 Future Projections

Change in the military segment of King County International Airport is not anticipated.

3.6 PASSENGER ENPLANEMENTS [MARKET SEGMENT 8]

3.6.1 Description

Passenger service may be in aircraft of any size, from a 747 to a nine-seater. Aircraft are certificated under FAR Part 121 if they are larger, and under Part 135 if they are smaller. However, the distinction between the two types of operator is becoming less marked as FAA's stringency increases for all types of operators. Over the years all types of operator have served KCIA.

3.6.2 Historical Activity

Over the past ten years, annual passenger enplanements at King County International Airport have ranged from a low of 1,237 in 1986 to a high of 21,088 in 1989 and are presented in Exhibit 12. The high number of passenger enplanements in 1989 were due to the fact that two charters, Great American Airlines and Casino Express, operated weekly gambling tours to Reno, Carson City, and Las Vegas, carrying 120 passengers on a typical flight. This changed after 1989 when the FAA no longer recognized these charters as "affinity groups", in which all the passengers on the plane are members of the same organization and know one another. It had been assumed that on these flights security was not an issue. The FAA now recognizes them as a public charter, with passengers required to go through security screening. The airport did not elect to pursue FAR Part 107 compliance, which would have required a $2 million investment (1980s prices) in renovating the terminal building. Charters operating out of King County International Airport moved operations to Sea-Tac. As a result, annual passenger enplanements out of King County International Airport dropped to 8,400 in 1990 to 7,000 in 1991, and have stabilized at around 2,200 as shown in Exhibit 12. The charters that do operate out of King County International Airport today, however, perform their own screening by using hand-held wands in compliance with Part 107 requirements.

[Cynthia's q to this last : are you sure? JR checking]

Exhibit 12

Historical Passenger Enplanements

Year	Passenger Enplanements
1985	NA
1986	1,237
1987	3,747
1988	2,052
1989	21,088
1990	8,377
1991	6,999
1992	2,165
1993	2,236
1994	2,300

Source: King County International Airport, 1995

3.6.3 Previous Master Plan Forecasts

The 1986 Master Plan did not provide passenger forecasts. Air Carrier/ Air Taxi operations were forecast to change as follows:

1984 4.2%
1990 4.5%
1995 4.9%
2005 5.7%

3.6.4 Present-Day Situation

There are currently two operators that handle passenger service at King County International Airport, West Isle Air and Scenic Air. Both began service at King County International Airport in 1995. Scenic Air offered tours of Mt. St. Helen's during the summer month of 1995. West Isle Air, however, operates all year long and offers daily flights to the San Juan Islands, to the business and leisure traveler. In 1995, West Isle Air alone enplaned approximately 2,000 passengers at King County International Airport in the nine months that it was in operation. Total passenger enplanements at King County International Airport for 1985 was not available. Total passenger enplanements for 1994 were estimated to be 2,300 and operations, about 2,230.

3.6.5 Factors Affecting Market Growth

Passenger enplanements over the past ten years reached a high of 21,000 in 1989 and have steadily decreased since then, averaging 2,000 annually.

Since leisure travel is projected to grow more than business travel and tourism is the fourth largest industry in the state of Washington, it is safe to assume that the region will continue to attract passenger activity. The extent to which this market growth can or should be attracted to King County International Airport is another matter. Factors affecting the feasibility of passenger service included the availability of connecting carriers, ground access, parking, passenger amenities and airline logistics. Typically, airlines dislike split operations because of the added cost of ground equipment, ticket counters, personnel if two locations have to be maintained instead of one. The biggest obstacle for airlines and passengers, however, is the time required and difficulty/ number of vehicle changes required to get from a gate at the primary airport to a satellite airport. This is a major deterrent.

If the rapid rail ballot passes, a rail connection could slightly alleviate the situation since the rail plan calls for a rapid rail station at the South end of KCIA and another at Sea-Tac. However, even with a rapid rail station at the foot of King County International Airport, the advantage for air passenger operations is limited. At that location there is no room for a passenger terminal

because of runway setback height restrictions in the east and Boeing Aerospace property in the west, so that there is virtually no possibility of a new passenger terminal near the proposed rail station. Even at the existing main terminal it is difficult to see how auto parking and aircraft ramp space could be accommodated in the limited land area, let alone flight kitchens and other ancillary facilities such as airline maintenance hangars.

3.6.6 Future Projections

King County International Airport's proximity to Seattle's Central Business District makes it an ideal location and low fees offer the airport the potential role of attracting a small share of the regional market, with a second point-to-point carrier of limited size.

3.8 "MOST LIKELY" FORECASTS

3.8.1 Findings

Preliminary unconstrained forecasts were prepared for each category of activity at the Airport. The preliminary work developed a wide range of methods and results for each market element. This work was then reviewed by the Airport planning team and a narrower band of future directions selected. These forecasts are still unconstrained "most likely" forecasts of activity over the Master Plan's 20-year time horizon.

The ultimate forecasts, constrained by what is possible, will be a result of the selected airport future, and thus are not described here. These unconstrained forecasts, designated "most likely" are used to assess capacity shortfalls in each area of operation and help provide the basis for an achievable preferred future. The original forecast work was presented to the TAC in January and the "Most Likely" forecast detail may be reviewed in a Technical report of that name.[5]

In summary here are presented the enplanements and operations, in Exhibit 13 and the fleet mix, in Exhibit 14.

Exhibit 13

SUMMARY OF "MOST LIKELY" UNCONSTRAINED FORECASTS

	1994	2000	2005	2010	2015
Passenger Enplanements	2,300	6,000	38,200	77,000	89,300
General Aviation	377,450	389,000	399,000	408,800	419,100
Other Air Taxi	21,235	25,400	29,400	34,100	39,500
Air Cargo	16,386	20,000	23,000	25,500	28,100
Aerospace	2,657	3,300	3,900	4,600	5,500
Military	3,076	3,000	3,000	3,000	3,000
Passenger	2,000	5,000	7,200	9,000	10,200
Total	422,804	445,700	465,500	485,000	505,400

Source: TRA-BV Airport Consulting, 1996

Exhibit 14

SUMMARY OF "MOST LIKELY" UNCONSTRAINED OPERATIONS BY FLEET MIX FORECAST

Fleet Mix	1994	2000	2005	2010	2015
Single-engine	286,563	292,000	295,300	298,000	303,700
Multi-engine	42,849	42,600	44,600	46,000	45,200
Turboprop	25,226	30,400	33,300	36,700	38,000
Turbojet	48,060	59,800	66,400	77,500	86,200
Helicopter	20,134	20,900	25,900	26,800	32,300
Total	422,804	445,700	465,500	485,000	505,400

Source: TRA-BV Airport Consulting, 1996

3.8.2 Issues

Based on these "most likely" forecasts and the fact that the airport is close to PANCAP (Practical Annual capacity[61]) in terms of airspace and has only 6 acres of leasable land available, it is clear that a major issue, if not THE dominant one for the Plan, is that not all desires for space can be accommodated. Since some categories of use, notably cargo and large corporate operations, are growing faster than others, there is more pressure to accommodate these. The Plan needs to achieve a balance between private and public interests in how the available capacity is allocated to competing demands.

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[1] PANCAP was indicated by the FAA Tower to have been approached in 1994, the highest year in recent times.

4. ECONOMIC CONDITIONS

4.1 AIRPORT ECONOMIC IMPACT STUDY TO BE ADDED

4.2 ECONOMIC LINKAGES (TO BE ADDED)

4.3 JOBS CREATION

4.3.1 Policy Context

The King County Comprehensive Plan, adopted by the Metropolitan King County Council in 1995, envisions that county government will pursue measures to promote workforce development and job opportunities and assume a regional leadership role in facilitating efforts to provide training and education programs to create a globally competitive workforce.

4.3.2 Opportunities

Initiatives which KCIA could become involved as a partner are:

- Federal Aviation Administration Education - FAA officials in Washington State are renewing their efforts to develop education programs that will help communities better understand the social and economic benefits of aviation.
- Tech-Prep - The Manufacturing Technology Advisory Group coordinates efforts in the creating of "tech-prep" programs for high schools and community colleges. The Boeing Company conducts the Boeing Tech-Prep Program, which provides paid summer employment and training for students.
- Duwamish Coalition - A public-private partnership, created in 1994 to examine economic and environmental issues in the industrial district surrounding the airport, had a Job Creation Subcommittee that selected KCIA as one focal point for its activities and felt the airport could help to highlight job and career opportunities in the industrial sector.

- Workforce Alliance of King County - An executive level committee of the Economic Development Founders Groups made up of the corporations that provide private funding for economic development in King County. The objective of this committee is to recommend strategic directions for workforce development in King County and to link workforce resources and programs into a more coherent whole.

4.3.3 Results to Date

KCIA has been incorporated into three grant applications for state and federal funds for "school-to-work" programs:

- Seattle School District in partnership with City of Seattle.
- South King County Tech-Prep consortium (including nine public school districts in South King County).
- Seattle and Highline public schools and Private Industry Council of King County.

4.3.4 Conclusions

A number of conclusions may be drawn from the exploratory analysis that the airport has performed so far:

- As "King County International Airport," the airport holds unique allure for aviation enthusiasts locally, nationally and internationally because of its historic and contemporary association with the Boeing Company.
- The east side airport terminal offers an attractive location for tours and other events to highlight aviation and aircraft manufacturing.
- The airport terminal complex has significant unused building space available for new activities.
- Many of the organizations and individuals contacted expressed strong interest in using airport space.
- The breadth of employment activities of KCIA could provide job opportunities and intern experiences for individuals with a very wide range of interests and abilities.

- Private, non-profit aviation groups want to create and/or expand youth activities at KCIA.
- Key airport tenants would consider participating in youth education programs.
- Boeing "Tech Prep" administrators would like to explore links with airport tenants.
- The airport is a potential "gateway" to industrial job opportunities that might otherwise be overlooked in the Duwamish corridor.
- Future education planning and program efforts may benefit from the establishment of an airport education advisory board.
- Youth programs at KCIA may enjoy strong community support and assistance.

4.4 Foreign Trade Zone Issues (To Be Added)

5. ENVIRONMENTAL CONDITIONS

5.1 INTRODUCTION

5.1.1 OVERVIEW

The Airport operates within the context of a wide array of environmental regulations. Over the years since it opened, and especially since about 1969 (the year of the National Environmental Policy Act, or NEPA), the regulations and procedures for compliance and remediation of environmental issues have become increasingly complex.

In summary however, the Airport is in good condition environmentally and does not have major new steps it needs to take on the field. Off the field, the primary issues relate to noise, air quality and storm drainage. Each of these is covered below, as well as other pertinent topics.

5.2 STORM WATER & WASTE WATER

5.2.1 Storm Water

5.2.1.1 Existing Situation

Since the airport has so many acres of pavement, it acts as a major source of surface runoff during rainy weather. It has an extensive storm drainage system. In accordance with the Airport's Storm Water Baseline General Permit, KCIA has conducted an inventory of the existing storm water collection system and has prepared a Storm Water Pollution Prevention Plan (SWPPP). The purpose of the SWPPP is to identify areas of potential pollution which may affect storm water discharge from KCIA. The SWPPP also identifies best management practices (BMPs) for source control and treatment of potential surface water contaminants. As a result, several oil/water separators have been added throughout the Airport, and there are plans for installation of additional separators in the west side conveyance system.

In addition, KCIA has directed tenants to develop their own SWPPPs and spill prevention plans, to obtain emergency spill equipment, and to conduct deicing and washing activities in designated areas. The Boeing Company has sampled storm water discharges that represent the combined flow from all KCIA property. At this time, analysis results have not been made available.

KCIA promptly applied for and received an NPDES permit for storm water when NPDES regulations were established. Additionally, as part of the storm water permitting process, KCIA distributed information and held tenant meetings to direct tenants to complete the appropriate NPDES permitting tasks.

KCIA performs a continuing tenant education program regarding storm water compliance and has recently conducted an informational inspection. KCIA continues to be proactive in the management of potential groundwater hazards and surface water impacts through further study of these issues and continuous education and evaluation of regulatory changes.

A new regional storm water permit was issued in July 1995 to King County, Seattle, Snohomish County, and the State Department of Transportation for the Cedar/Green Water Quality Management Area. This permit, issued by the State Department of Ecology for the Cedar/Green Water Quality Management Area, requires multi-jurisdictional permittees to engage in more systematic coordination on drainage than currently occurs in the vicinity of KCIA. Airport staff have begun coordination efforts with Boeing, since Boeing is the largest single tenant at KCIA and the largest property owner between the Airport and the Duwamish River. Boeing plans to add more oil/water separations and may seek KCIA cost-sharing or other collaboration.

Some of the coordination efforts on drainage issues will be addressed in the environmental section of the Strategic Master Plan.

While the Airport is located entirely within the city limits of Seattle and Tukwila, King County government retains responsibility for storm water and other land issues at the Airport under Chapter 15 of the Revised Code of Washington (RCW), governing municipal airports.

King County pays Tukwila and Seattle for surface water management fees even though it receives no surface water management services from the cities. Although the County Surface Water Management (SWM) Division is responsible for surface water management in unincorporated areas, this function at the Airport is carried out by Airport staff.

5.2.1.2 Issues

Storm drainage issues terms include the continued need for coordination with other jurisdictions and with Boeing on such issues as oil / water separators and possible cost-sharing and collaboration; and resolution of SWM fees and services with the local jurisdictions.

5.2.2 Sanitary Sewer System

5.2.2.1 Existing Situation

The Airport is served by a sanitary sewer network that collects both from buildings and from wash pad and de-icing areas. One tenant still uses a septic system. There are a few cross-connections with sanitary sewer lines feeding into storm drains, and vice versa. Spills of fuel or other hazardous liquids may collect in either system.

Most of the airport's water use for irrigation is metered separately to reduce sewer charges.

5.2.2.2 Issues

The sanitary sewer system needs to be the primary collector for anything other than clean water. The sewer treatment system is able to deal with most normal airport products in the concentrations they are normally found in. A key issue around sanitary sewer usage is ensuring that all materials drains into sanitary sewers rather than storm drains ; this requires a continuous tenant educational and reinforcement effort; another issue is to evaluate the merits of metering the remaining irrigation water supplies, so that the Airport's sewer rates are appropriate . Procedures are in place that may need revisiting from time to time, for dealing with larger spills

that may enter the sanitary sewer system and require notification of the sewage treatment authority

5.2.3 Aircraft De-icing and Washing

5.2.3.1 Existing Conditions

KCIA has 5 aircraft wash pads that are approved for aircraft deicing. These wash pads are capable of containing residual deicing fluid or discharging it for treatment to the sanitary sewer. The Boeing Company has an area large enough to collect residual deicing fluid from large aircraft. UPS is the only cargo carrier that has an agreement with Boeing for use of their wash pad. KCIA recently installed a large aircraft deicing pad on the KCIA terminal apron as part of its SWPPP. The addition of this facility will promote deicing in approved, designated areas.

Tenants have been directed by KCIA to conduct aircraft and vehicle washing in wash pads where wash water is directed to the sanitary sewer. As an alternative, they have been directed to construct wash pads at their facilities or otherwise collect and properly dispose of wash water.

5.2.3.2 Aircraft Washing and De-icing Issues

The main issue is to ensure adequate tenant education for appropriate washing and de-icing operations. In addition an enforcement program and suitable penalties need to be developed. A third issue will be to ensure sufficient numbering de-icing and washing areas as the airport activity grows.

5.2.3.3 Spills and Spill Prevention

KCIA has developed a spill response plan addressing all likely types of contaminants as described in the SWPPP. The Airport has directed tenants and fueling companies that service the airport to provide their own spill response plans and equipment. Spill response procedures by the Airport Fire Department are constantly being upgraded as spill events are evaluated as new

regulations come into play. The KCIA Fire/Police Unit have HO_2 Materials Response training to take care of problems that arise. With mutual aid assistance, the catastrophic spill can be isolated. The storm drainage system is not designed to handle a catastrophic spill that could occur from a ruptured fuel truck tank or fully fueled jet aircraft.

5.2.3.5 Issues

There are presently no issues or concerns regarding spills and spill prevention at KCIA. KCIA does not have a current capability for isolating a catastrophic spill. The existing storm water system has handled an 11,000 gallon rupture by shutting off the pump house.

5.3 SUB-SURFACE CONDITIONS

5.3.1 Soils and Groundwater Quality

5.3.1.1 Existing Conditions

KCIA has been proactive in management of potential groundwater hazards and surface water impacts and is in full compliance with regulatory requirements for these areas. Soil or groundwater characterization and/or cleanup has occurred at the Boeing EMF Facility, the fire training pit area southeast of the Georgetown Steam Plant, and the steam plant site. Soil and groundwater cleanup standards should be determined for airport properties based on their proposed future use and the highest beneficial use of area groundwater.

KCIA recently evaluated past and present activities conducted at the airport to develop an overview of airport environmental and contamination issues.

5.3.1.2 Issues

King County International Airport is planning a series of actions to mitigate potential groundwater hazards and surface water runoff impacts. For example, the Airport will be continuing a heating oil tank removal or replacement program in anticipation of heating oil tank regulations.
Implementation of a more formalized environmental compliance and tenant audit program is

needed, with a regular schedule of inspections as well as random audits Pursuit of cooperative approaches to storm water management will continue. Installation of new oil/water separators will continue. Replacement of pumps in the two storm water lift stations is planned for the near future. Removal of sediment from the storm sewer pipes and structures is an ongoing concern. Last but not least, there may be a need to investigate soils condition on some parcels to identify contamination levels and types.

5.3.2 Underground Storage Tanks (USTs)

5.3.2.1 Existing Conditions

In the mid-1980s, prior to establishment of federal and state UST regulations, KCIA initiated cataloging all existing USTs on airport property and established a formal program to inventory and remove or upgrade KCIA owned tanks. When UST regulations were first promulgated, KCIA sent out copies of the regulations to all tenants with potential UST compliance requirements.

There are numerous USTs located at KCIA that are used for aircraft and automotive fuel and waste oil storage. Some are owned by KCIA; most are owned and operated by tenants. More recent KCIA lease agreements require that each tenant must maintain their USTs in accordance with UST regulations. Presently, all USTs known to have existed or that are currently present at KCIA have either been removed, or are permitted and are in compliance with Ecology regulations. However, the lack of UST cleanup and reporting requirements prior to 1989 presents the possibility that there may be petroleum contaminants present at KCIA from both active and abandoned USTs.

There is contamination from USTs at the KCIA maintenance shop and terminal building, the North Field Property leased to Boeing, and the Flight Center facility

KCIA performs an annual inquiry and inventory of tenant permit renewals for USTs.

5.3.2.2 Issues

Issues for Underground Storage Tanks include continued tracking of UST regulations and tenant UST permits.

5.4 HAZARDOUS MATERIALS

5.4.1 Above Ground Tanks (TO BE ADDED)

5.4.2 Paints, Solvents and Other Materials

5.4.2.1 Existing Conditions

KCIA and airport tenants currently store hazardous materials both indoors and outdoors. Hazardous materials include paints, cleaners, solvents, and petroleum products. Tenants have been directed by KCIA to comply with applicable regulations including spill prevention control, secondary containment, integrity and leak detection monitoring, emergency preparedness plans, and overfill protection.

Additional sources of petroleum and solvents are aircraft and vehicle maintenance, fueling, and storage conducted in hangars or buildings, apron, and tie-down areas.

Herbicides and pesticides are used at KCIA to control vegetation growth and eliminate insects. Pesticides and herbicides are applied by a licensed pesticide and herbicide contractor.

Foam used in fire control and fire practice can be a source of contamination. Currently the Airport does not use foam although Boeing may use foam on some occasions. The new Vulcan hangar will have a foam area with drainage to the sanitary sewer system, which can handle this type material with no problems.

Hazardous building materials are another potential source of contamination and health problems. KCIA has developed a plan for asbestos abatement at airport owned buildings.

5.4.2.2 Issues

An inspection and education program to improve compliance with all of the above actors will be developed as part of the SWPPP. Ongoing vigilance on the part of airport staff is a key issue. Guidelines for proper oil and solvent usage and disposal on KCIA property will be developed and implemented as part of KCIA's Storm Water Pollution Prevention Plan (SWPPP).

There are no issues or concerns regarding pesticide and herbicide usage at KCIA.

The airport does not have information concerning other hazardous building materials in KCIA owned buildings.

5.4.3 Hazardous and Solid Waste Disposal

5.4.3.1 Existing Conditions

Disposal of these wastes is the responsibility of each individual tenant. Solid waste is handled by municipal solid waste disposal utilities and hazardous waste disposal is contracted individually by tenants. Boeing operates a waste separation facility on the North Field for their own use.

5.4.3.2 Issues

A waste storage program could be implemented by KCIA and made part of the education and inspection program. This would enable a more consistent standard of control to be maintained. Costs and fees for such a program would need to be explored, as would liability issues.

5.5 Air Quality

Air pollution may be either from mobile sources such as aircraft, ground support equipment and highway traffic, or from stationary sources such as power plants, paint shops and the like. Any assessment of air quality issues and needs must look at both.

5.5.1 Stationary Sources

5.5.1.1 Existing Conditions

KCIA's stationary sources of air pollution are minimal. The Airport has a permit for two steam heat boilers and a paint booth. Boeing's paint facilities are permitted air pollutant sources at KCIA. There are no other significant stationary sources.

5.5.1.2 Issues

There are presently no issues or concerns for stationary source air quality at KCIA. Air quality issues regarding aircraft or vehicle emissions are addressed below.

5.5.2 Mobile Sources

5.5.2.1 Existing Conditions

Air quality is a sensitive issue. Problems, especially at urban airports, are hard to identify and quantify, yet it is very apparent to the recipient when, for example, an engine runup directs fumes at one's home or office in the airport neighborhood. Separating fact from perception and finding solutions that will make a difference are key objectives for any airport.

Perceptions of the issue: Critical airport air quality issues often mentioned by citizens and airport neighbors can result from a number of activities that may be present at or around any airport. These include the odors and emissions that may result from to aircraft fuel "dumping". Other emissions may be due to vehicular trips to the airport, including fueling trucks, catering trucks, taxis, security, and other vendors. Other emissions are due to aircraft operating on the airport, including landing, taxiing, takeoff.

Emissions due to aircraft in flight are another candidate source of air pollution. lastly, emissions due to other equipment at the airport (i.e., ground support equipment) are a possible source.

Research results: Investigation of these issues has occurred as part of the Master Plan. A summary of findings suggests that not all perceptions can be validated by research and analysis. For example, reports of odors and emissions from aircraft fuel "dumping" are typically associated with observations which are misinterpreted. Fuel dumping is considered an emergency procedure performed by the aircraft operator when immediate reduction of the aircraft landing weight is necessary. Such reports may be the result of specific conditions (e.g., temperature, type aircraft).

It has been found that vehicular trips to the airport are typically the greatest contributor to emissions at and around airports (est. 64%). On the other hand, within the airfield, taxiing aircraft and runups typically represent the greatest percent of emissions for all aircraft operating on the airport. The greatest emissions from aircraft in flight occur during takeoff/climbout and approach (total aircraft contribution est. at 30%).

It has also been found that, depending on pollutant reduction methodology, reductions to one pollutant (i.e., CO) may cause an increase to another (i.e., NOx.). While conversion from gasoline to propane or CNG decreases HC and CO, it can increase NOx - especially important when evaluating whether or not the air quality problem is that of NOx. NOx has a varying effect at different altitudes. Aircraft generally represent only 2 percent of NOx, but routine flight levels of 30,000 to 40,000 feet, NOx contributions may be contributing disproportionately to global warming.

Ground Support Equipment (GSE) emissions are less than both aircraft and vehicle emissions (est. 6%).

Current Airport Air Quality Regulations include: 1) The Clean Air Act and Amendments; 2) Aircraft Emissions Standards; and 3) Airport Certification. Federal Air Quality Standards are being met (PSAPCA 1994) at the closest monitoring station (4752 E. Marginal Way S.).

5.5.2.2 Issues and Possible Future Direction

According to a report published in 1994, aircraft and aircraft equipment represent only 1-2% of Puget Sound pollution sources.

Specific issues at KCIA relate mainly to neighborhood impacts during aircraft runups. Addressing this concern needs to occur within the context of overall trends nationally in the aviation industry. For example, a development impacting air quality at and around airports is the fact that jet engines are more fuel efficient and are producing less jet aircraft emissions. Air Quality Standards may force the phase-out of piston engine aircraft due to the high cost to re-engine them. Vehicle emissions continue to improve. 1994 vehicle emissions are approximately 25% of 1975 vehicles. As KCIA's fleet mix shifts to more jets and fewer piston aircraft, this should aid the overall situation.

The EPA attempted to release a Federal Implementation Program (FIP) for the Los Angeles area which required fixed ground power and preconditioned air at all permanent terminal gates by the year 1999 with an ultimate zero emissions goal for all Ground Service Equipment (GSE) by 2010. The FIP was rescinded in the political process. Given this outcome and the act that GSE contribute only a small percent of the air pollution, KCIA could expect similar results.

Appropriately, a tremendous amount of effort has been expended nationally into the measurement and mitigation of aircraft landing and takeoff emissions while a minimal amount of effort has been expended into the emissions mitigation of GSE.

Opposition from airlines and aircraft manufacturers delays environmental reform. However, the FAA is in the process of updating "Air Quality Procedures for Civilian Airports and Air Force Bases" which will address air quality rules and regulations, update previous discussions of air quality analysis methodologies, and provide key references for funding analysis of additional air quality data.

Sea-Tac has been doing air quality work that appears to be years ahead of most other airports. They are going through a conformity determination to determine if the biggest air quality problem involves air travel or surface travel. KCIA may be well-advised to see if this work could provide any guidelines, without having to use similar resources. The Sea-Tac Airport Master Plan Update Draft EIS states that airport-related pollutant emissions from Sea-Tac are less, and would continue to be less, than levels forecasted by the State Implementation Plan with or without airport improvements. KCIA could expect similar findings.

Additional understanding of air quality around KCIA is needed. At issue is how to address concerns in a manner than will yield reliable estimates of the problem and practical solutions. Three methods have been identified to perform air quality analyses:

1. Install air quality monitoring equipment. Air Quality Monitoring Equipment is expensive and does not yet identify the source. It can identify whether there is a problem but cannot identify where the particulates are coming from and what the sources are.

2. Inventory all air pollutant sources and calculate associated emission levels using an emissions database. This emissions inventory is then followed by calculation of dispersion of these emissions to produce a concentration.

3. Run computer model to calculate emissions. The EDMS model, developed by the FAA, is currently the best choice in defining and addressing air quality issues at King County International Airport. It involves conducting an emissions inventory and applying meteorological data to perform a screening level analysis. Beyond that, a refinement level analysis could be performed but would require years of data collection.

It would be useful to determine if there are any abatement techniques or equipment that could be installed rather than doing more analysis. It is clear that there's an acute problem at certain times and places but not a measurable chronic problem.

5.6 MITIGATION FEES

5.6.1 Existing Situation

Given the heightened focus on environmental issues in the past 10-20 years the question arises as to whether there should be some more direct way at KCIA of collecting funds from the responsible parties, who are usually airport tenants. Motion 9523 adopted April, 1995 requires the Executive to explore a new type of airport fee that is described as a mitigation fee. King County International Airport currently collects revenues from four sources: landing fees, fuel flowage fees, aircraft storage fees, and rental/lease income. General purpose County ordinances permit the County to impose impact fees for the mitigation of impacts of new developments. Impact mitigation fees may be used to address transportation, schools, parks/open space, and Surface Water Management needs.

5.6.2 Mitigation Fees as Applied to KCIA

One question is the airport's jurisdiction in such matters. KCIA is owned by the County but lies within the cities of Tukwila and Seattle. The County, however, is provided the power to govern the airport, including establishment of permits and zoning. Nevertheless, County ordinances on impact fees do not specifically reference the Airport and would need to be amended to permit an Airport impact or mitigation fee.

Impact mitigation fees are likely permissible within some fairly restrictive federal constraints. Advice to date suggests they cannot strictly be called "mitigation fees" but more properly should be "fees for services". Fees for aeronautical users at all federally-assisted airports must, under federal law, be "reasonable" and "not unjustly discriminatory". US DOT/FAA last year issued a preliminary policy regarding Airport Rates and Charges which may have a significant impact on the types of fees airports may charge to aeronautical users. One requirement being debated in the

draft is that fees must reflect the airport's historical costs of providing services. A final policy on Airport Rates and Charges is due soon.

Under current federal procedure, airports seeking to include environmental costs in their rates may generally only do so to the extent that they incur an actual expense in the year the fee is charged. In FAA's view, mitigation of environmental impacts is an operating cost. This is somewhat at odds with the County's existing mitigation fees, which allow five years from when the fee is collected, to do the mitigation project.

Additionally, airports are under a continuing federal obligation to use airport revenues only for the capital and operating costs of the airport, commonly known as the prohibition against diversion of airport revenue.

Another federal issue is that there could potentially be an FAA "unjust discrimination" problem if one-time impact or mitigation fees along the lines of King County Code provisions were imposed on new entrants to the KCIA market. If only new operations were charged, even though they were similar to operations by incumbents (who were not charged such fees), FAA would describe this as discrimination. To conform with FAA requirements, fees may have to be based on the type of operation and the nature of the impacts it generates, rather than on when the operation started, as would be the case with County regulations

Finally, another federal consideration is that a Federal Aviation Regulations "Part 161" rulemaking process for noise-related access restrictions could be invoked if the FAA believed that the true purpose of the fees were not to collect funds to be used for mitigation, but rather to affect the operation of aircraft in order to control noise, directly or indirectly, at the airport. This is a very complex and time-consuming process.

5.6.3 Issues for Further Examination

The first issue is whether such pollution exists that separate fees should be assessed to pay for it. The source could be ground water, or is likely to be created, noise or air pollution or any number of other problems. The need has not yet been fully quantified but can be assumed to exist at some scale. Lease revenues are not currently set to cover this type of cost and nor is any other airport fee.

Applying existing County procedures to the Airport requires establishing the mechanism. This would require a revision to the existing County impact fee ordinances, to address the Airport specifically and to be collected and expended annually. The second step is establishing the rate, which must be set at a level that is "reasonable for use of Airport facilities" and needs to relate to a set of proposed expenditures for that same year.

One approach could be a "fee-for-service" approach that identifies a desired service provided by King County and then imposes service fee rate adjustments when developments change the demand for such services. This is feasible as long as it does not discriminate among operators. To resolve the issue of whether a new mitigation fee can be created at King County International Airport, it is likely that additional legal work will be needed.

5.7 Historic Structures

5.7.1 Existing Conditions

KCIA has two structures on the National Registry of Historic Places, the Red Barn and the Steam Plant. No additional surveys have been conducted in recent years to determine if other resources are now eligible.

5.7.2 Issues

A current survey of structures should be conducted to determine if any other structures are now eligible. Such information could influence the Master Plan development.

5.8 SENSITIVE AREAS

5.8.1 Existing Conditions

There are no known sensitive areas per King County Sensitive Areas Map Folio.

5.8.2 Issues

None.

5.9 OFF-AIRPORT LAND USE (FULLER DETAIL TO BE ADDED)

5.9.1 Existing Conditions

Land use categories within a half mile of the airport include industrial, commercial, single- and multi-family residential, institutional (schools, hospitals, and churches), open space, and water.

Detailed analysis of the areas, populations and types of buildings within the 65Ldn noise contour will be developed once the final forecasts of activity are adopted.

5.9.2 Issues

Issues relating to airport neighbors center around aircraft noise, ground noise such as runups and the Boeing wind tunnel, and air quality. These issues are discussed elsewhere in this paper.

6. FINANCIAL CONDITIONS

6.1 HISTORIC REVENUES AND EXPENDITURES (TO BE ADDED)

6.1.2 Issues

The airport currently has one fund into which all revenues are placed and the budget process allots these funds to operating, capital or reserve. However, there has in the past been no Reserve Study that would examine the life cycle of each element of airport infrastructure, calculate its replacement cost and assign a per square foot or other fee to set aside replacement capital funds on a year buy year basis.

In recent years Congress has been reluctant to authorize all funds requested by FAA, as the Aviation Trust Fund balance helped to make the federal deficit look less severe. Since late 1995 the lapsing of authorization to collect a 10% ticket tax has led to depletion of the Aviation Trust Fund and thus the funding source for all Airport Improvement Funds is in poor shape. Compounding this problem for "reliever" airports such as KCIA, is a parallel decline in the FAA's reliever airports funding program continuing to make KCIA's need for self-sufficient operation much more critical.

Significant airport revenues continue to go to the increasing cost of and need for airport deferred maintenance (e.g. aging facilities). This maintenance is necessary to protect the airport resource, but diminishes opportunities to fund development/ economic growth projects.

There is a lack of clear and equitable guidelines for assessing charges to pay for airport capital and operations, such as establishing landing fees at a rate to pay for airfield operations, maintenance and capital replacement, and rent to pay for facilities (buildings, aprons, etc.). In addition, revenue programs are needed to financially mitigate impacts such as noise, water quality, etc.

6.2 COMPARATIVE INFORMATION

6.2.1 Background And Methodology

Nineteen regional and national airports were surveyed by telephone to collect information on pricing strategies and rates and charges currently in place at each airport. The study airports were:

Regional	National
Arlington Municipal Airport	Burbank-Glendale-Pasadena Airport
Auburn Municipal Airport	Fort Lauderdale Executive Airport
Bellingham International Airport	Hillsboro Airport
Bremerton National Airport	Long Beach Municipal Airport
Olympia Airport	Palwaukee Municipal Airport
Renton Airport	San Diego International Airport
Seattle-Tacoma International Airport	San Jose Airport
Snohomish County Airport	Scottsdale Airport
Vashon Municipal Airport	Van Nuys Airport
	Westchester County Airport

The data collected during this study included rates charged for landing fees, fuel flowage fees, land leases, hangar and tie down rentals, terminal building leases, other airport-owned building leases, and transient aircraft parking[7].

6.2.2 Survey Results

The results of the survey are organized and discussed according to the major revenue sources generally available to all airport authorities. These include airfield reserves and income from airport property and facilities.

6.2.2.1 Airfield Revenue

Landing Fees: King County International Airport's landing fee is currently $0.35 per 1,000 lb. and it is only applied to "for hire" aircraft. Of the surveyed airports that charge a landing fee, Bremerton is the only airport with a fee lower than King County International Airport. The fee has remained the same for approximately 20 years.

Fuel Flowage Fees: The fuel flowage fee at King County International Airport is $0.05 per gallon, which is average compared to the airports surveyed. The airport's rate is set by policy based on a survey of fees charged at competing airports.

Passenger Facility Charge (PFC): This is a federally authorized user-charge and since King County International Airport does not have significant passenger operations, this change does not currently apply.. However, King County International Airport does charge a passenger terminal use fee of $0.50 per passenger to passengers deplaning from aircraft with 10 or more seats.

6.2.2.2 Income From Airport Property and Facilities

Rental Income From Property

Aviation Land: The surveyed airports have an average lease rate of $0.45/sf/yr. with a median rate of $0.34/sf/yr. Currently, the average lease rate for aviation land at King County International Airport is $0.46/sf/yr.

Non-Aviation Land: The surveyed airports vary widely as to the amount of non-aviation land they possess, the uses it is put to, and its revenue-generating capabilities. In the survey group the results were as follows:

- General non aviation: Lease rates range between $0.60 and $0.80/sf/yr.
- Commercial land: Lease rates range between $0.59 and $1.50/sf/yr.

- Business park: Only one airport leased land specifically designed for business park development and the average lease rate is approximately $0.42/sf/yr. set in 1985 and in place until 2000.
- Industrial land: lease rates range between $0.34 to $0.90/sf/yr.
- Heavy manufacturing: The only airport that has a portion of the airport zoned heavy manufacturing is Long Beach with this area leased to McDonnell Douglas Corporation for 50 years.

Special Lease Agreements: Some of the airports have one or two major tenants on large parcels, and may negotiate special agreements. For example, Snohomish County Airport has an operating agreement with the Boeing Aircraft Company. It consolidates all the rates and charges assessed to Boeing activity into a single formula.

Rental Income From Facilities

The other major source of rental income is from the leasing of airport-owned facilities. The following table shows the lowest and highest rental rates reported for each major facility type and BFI's rental rates.

Exhibit 14

Summary of Rental Rates for Airport Facilities

	Low Rate	High Rate	KCIA Rate
Hangar Rentals			
Airport-owned Hangars[1]			
single-engine	$87/mo.	$235/mo.	$325/mo.
multi-engine	$150/mo.	$480/mo.	$350-$390/mo.
FBO-owned Hangars[2]			
single-engine	$175/mo.	$521/mo.	na
multi-engine	$185/mo.	$870/mo.	na
Tie-Down Rentals			
single-engine	$28/mo.	$293/mo.	$81/mo.
multi-engine	$28/mo.	$329/mo.	$81/mo.
Transient Aircraft Parking			
single-engine	$2/day	$35/day	$5-$61/day
multi-engine	$2/day	$63/day	$5-$61/day
Terminal Space Rental			
	$8.50/sf/yr	$47/sf/yr	$8.80/sf/yr

[1]The airport owns the hangar facilities and acts as property manager renting space directly to users.

[2]The airport leases undeveloped land which is then developed by the tenant (an FBO) with the goal of leasing hangar space at a profit. The FBO hangar rental rates tend to be higher than the airport's rates, but the hangars are typically newer and include more amenities.

6.2.3 Summary of Survey Findings

The airports surveyed cover a wide range of airport types, with significant variation in their tenants and users, financial status and types of business activity. The financial status of the airports varies substantially with some facilities consistently maintaining self-supporting status

while others enjoy financial support from other sources including in some cases the use of general tax revenues.

As is the case with general aviation airports nationwide, the smaller ones generally are not self-supporting unless they own a lot of land, and have general tax support whereas the larger ones have generally managed to achieve a measure of financial self-sufficiency and independence.

In addition, some of the airports surveyed are involved in other lines of business that generate positive returns which can be used to minimize the rate impacts to aviation users. For example, a few of the airports own and manage land that is leased for commercial and industrial development, usually at a higher rental rate than comparable aviation property. This is common in the case of former military fields which generally have substantial adjacent land.

There are also significant differences in the application of particular revenue mechanisms and the current level of airport rates and charges. In any particular rate category, there is significant variation among the airports. For example, the current landing fees at 11 of the airports range from a low of $0.20/1,000 lb. to a high of $3.11/1,000 lb.; the remaining eight airports do not charge landing fees. The range of rates reflects each airport's user mix, the price sensitivity of their various tenants, and diverse policy objectives.

The methodologies used to set rates and charges do not vary significantly across the different airports. However, some of the airports did not report their rate methodologies. Of those airports responding, most of them based their landing fee on either a residual[82]or cost recovery[9]approach. Only four airports reported their methodology for setting fuel flowage fees. All four said they conduct rate surveys of competing airports. Four general approaches were identified for setting land rates: fair market value based on appraisal, cost recovery, surveys of similar airports and negotiations. Most of the airports use one or more of these methodologies to

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[2] Non-airline revenues are credited against costs to determine the net revenues required from airline rates and charges.

set their land rates. Rate surveys are often conducted by many of the airports to better understand the local market for aviation facilities. For many of the airports the above cited methodologies provide a starting point for price setting with the final rate or fee determined by policy.

Based on the survey results and discussions with staff at the selected airports, the financial practices tend to evolve according to the individual circumstances and the policy environment at each facility. Thus, while there may be substantial consistency in the choice of financial tools and mechanisms used by these airport authorities, the application of these tools varies significantly according to the unique operating and market factors at each airport. The common objective in most cases is to be responsive to opportunities and constraints while maintaining appropriate levels of service and providing adequate facilities.

The main value of the survey for KCIA was to suggest competitive alternate airports if rates were changed here.

6.2.4 User Cost Analysis of Regional Aviation Market

6.2.4.1 Introduction

In the previous section the survey of rates, charges and pricing methodologies at several national and regional airports were discussed. The results illustrate how much variation there is in the rate structures from one airport to another. The rates and charges information collected from the ten regional airports are used below to develop user cost profiles for each of these facilities. This was accomplished by estimating the annual costs typical aviation users would incur at each of the airports. The purpose of this cost comparison is to illustrate where King County International Airport/Boeing Field fits into the regional aviation market with regards to pricing polices and user costs. The results provide a sound basis for future financial policy development.

To ensure a wide representation of aviation facility users, nine "prototypical" user types were identified. These user types cover a wide range of activity levels and all have a variety of different service needs. These characteristics will influence the total costs each user would likely

incur at each airport. Five of the prototypical user types are assumed to be based at the airport. These five user types are recreational user, small corporate user, large corporate user, cargo user, and a fixed-base operator (FBO). The costs for transient users is estimated using the following four prototypical user types: recreational user, corporate user, charter user, and a cargo user. Annual costs are estimated for the five user types based at the airport and per visit costs are estimated for the four transient user categories.

A large manufacturing user, such as the Boeing Aircraft Company or McDonnell Douglas Corporation, was not included in this analysis because, due to their large presence and specialized needs, the location decisions of this class of tenant are based on many more variables than a simple cost comparison of airport facilities. In addition these users tend to negotiate rates and terms on an airport by airport basis, therefore, generalized cost estimates would not be particularly relevant or useful in evaluating policy issues associated with this user type.

6.2.4.2 Summary of Findings

A major objective of this cost comparison analysis is to focus specifically on the issue of how BFI fits within the regional aviation market from the perspective of current users of airport facilities. This section addresses this issue by looking at the total cost impacts for each user type to examine how user costs vary among airports and among types of aviation users. In addition BFI's relative ranking will be discussed in the context of the major cost components to identify the relative contribution of each. The evaluation considers the airport-based users and transient users separately.

6.2.4.3 Airport-Based Users

If a prospective airport user was evaluating potential locations in Western Washington they would need to consider a number of factors before selecting the most appropriate base for their operations. Factors would likely include location, proximity to residence or business interests, accessibility, amenities, space availability, lease terms, and the relative cost of operations. This analysis focuses exclusively on the question of user costs. The following table presents the

estimated annual cost of operations for each of the prototypical users at BFI and other regional facilities.

Exhibit 15

Regional Cost Comparison

Airport Based Users (annual costs)

	Recreational	Small Corp.	Large Corp.	FBO	Cargo
Arlington	$398	$2,231	$11,085	$10,426	$226,426
Auburn	$576	$2,064	$3,200	$16,000	$16,000
Bellingham	$428	$2,370	$18,527	$40,622	$383,162
Boeing Field	$997	$4,410	$17,881	$51,906	$295,116
Bremerton	$339	$2,600	$1,909	$6,319	$42,439
Olympia	$331	$2,200	$15,100	$41,751	$342,813
Renton	$1,029	$4,284	$9,770	$33,852	$105,852
Sea-Tac	$562	$7,878	$22,912	$49,650	$536,670
Snohomish	$497	$3,888	$12,770	$33,852	$286,212
Vashon	$360	----	----	----	----

Source: Berk & Associates, 1996

Costs associated with Vashon Municipal Airport are only estimated for the recreational user since the airport's facilities can only accommodate the needs of this user type. Vashon Airport is operated as a non-profit organization, it has no fuel service and members pay $30 per month for land leases.

As the table shows, BFI is generally one of the more costly airports from which to establish a base of operations, whether the user is a recreational pilot or a commercial cargo operator. This

is to be expected given Boeing Field's Central Puget Sound location, proximity to downtown Seattle, and the higher land values in the area.

However, BFI is not equally more costly to all user groups. For instance, the annual costs for recreational users and FBOs are estimated to be among the highest within the regional market and between 1.5 and 2 times the average cost of all the airports for these user groups. BFI is a relatively better value for the corporate users. While BFI is still ranked among the more expensive facilities in the region, the costs are estimated to be less than 1.5 times the average for the group and between 56% and 78% of the cost at Sea-Tac, the most expensive facility in these categories. The cargo operator appears to fare even better than the corporate users, ranking 6th of 9 facilities. Estimated costs to operate a cargo facility at BFI are only 19% above the average for the group and just over half the costs (55%) at Sea-Tac, the most expensive site.

Land at Boeing Field is generally the most expensive aviation property in the regional market. As a result, BFI ranks among the most expensive facilities with user groups whose costs are primarily a function of land costs, as in the case of an FBO. The variation among the other user groups can be traced to the different operating needs of each user and the different pricing structures and policies at each facility.

The other major airport costs facing users are the fuel service fees and airfield access charges. The fuel flowage fee at BFI is $0.05 per gallon, which is among the higher rates in the regional market. As a result, users with significant fuel needs, due to frequent operations or long average flights, will experience relatively higher costs at Boeing Field, although there is less variation among the regional airports in this fee than the others.

The most significant cost difference among the airports appears to be a result of the variation in airfield access pricing and policies. BFI only charges landing fees on aircraft "for hire". As a result, of the prototypical users, only the cargo operator would be required to pay landing fees. In addition to the limits on who is required to pay, BFI also has one of the lowest landing fees in the regional market. Thus, for most user groups, the greater the use of the runway facilities, the more

affordable BFI becomes relative to other facilities. This is particularly true for the Large Corporate and Cargo user groups.

To demonstrate this phenomenon, one need only compare the cost breakdown for the three most costly airports for the Large Corporate user. Sea-Tac is the most costly with estimated Large Corporate user costs of $22,912, followed by Bellingham at $18,527 and Boeing Field at $17,881. If the landing fees are excluded from the cost picture, BFI is the most expensive facility of the group at $17,881 compared to $17,430 for Sea-Tac and $15,624 for Bellingham. The net effect of the landing fee policies is to make BFI a better overall value for the user groups with larger aircraft.

6.2.4.4 Transient Users

The comparison of user costs among the regional airport facilities for the different types of transient users is presented in the following table. Given its location, BFI appears to be a relative bargain for these user groups. In each case the costs at Boeing Field are less than the average for the group, though the average is somewhat skewed by Sea-Tac, which is significantly more costly than the other facilities. This is generally due to the same landing fee factors discussed for the based-user groups.

Exhibit 16

Regional Cost Comparison

Transient Users (cost per trip)

	Recreational	Corporate	Charter	Cargo
Arlington	$5.60	$15.50	$80.00	$80.00
Auburn	$4.00	$4.00	$16.00	$16.00
Bellingham	$7.27	$20.03	$464.35	$164.35
Boeing Field	$10.50	$18.75	$157.45	$107.45
Bremerton	$2.50	$2.50	$31.40	$31.40
Olympia	$6.45	$13.88	$145.39	$145.39
Renton	$13.20	$23.50	$72.00	$72.00
Sea-Tac	$63.50	$71.75	$579.90	$279.90
Snohomish	$8.40	$15.00	$136.20	$136.20
Vashon	----	----	----	----

Source: Berk & Associates, 1996

6.2.5 ISSUES

This comprehensive review of rates and costs of doing business at comparable airports indicates that KCIA is at the higher end of the price spectrum for most services but has some latitude for higher rates, especially given its location and growing demand.

6.3 NEW REVENUE OPPORTUNITIES

6.3.1 New Lease Rates And Lease Framework

The lease analysis will include the following major analytic and research tasks:

- Review of industry financial practices
- Analyze the relative cost of using King County International Airport and other regional airport facilities
- Evaluate the appropriateness of using impact fees for environmental mitigation
- Provide an overview of valuation methods as they apply to aviation facilities
- Provide an evaluation of cost recovery issues for transient aircraft
- Develop an airport pricing spreadsheet
- Develop draft lease goals and policies for King County International Airport
- Propose and evaluate alternate revenue strategies packages

7. ADMINISTRATIVE CONDITIONS

7.1 LEASE AND CONTRACT DOCUMENT REVIEW

The Airport in the 1994-6 timeframe has reviewed and updated all major airport lease and use contract documents. These documents include the Airport Lease Agreement, the General Terms and Conditions Document, the Monthly Rental Agreement and the Operating Agreement. Each document was updated with language offering greater protection to King County in the areas of hazardous substances, risk management, mitigation of current and future environmental issues, and subleasing and assignment of leases.

Major revisions include:

- Updated hazardous substances language to reflect current state and federal reporting requirements and to establish follow-up procedures for the detection of such substances on Airport premises, whether or not the tenant is the cause of any contamination. These amendments will ensure that the Airport has knowledge of all potential contamination issues, regardless of cause, and that all clean-up operations will be performed consistent with established safety and environmental standards.

- Revised risk management language to clarify the respective role of each party to the lease and to quantify and detail insurance requirements of lessees holding long term leases.

- New Sublease and Assignment of Lease language to provide the county timely notification of a request to sublease or an assignment of a lease; seventy-five per cent of any "Assignment Premium" or "Sublease Premium" negotiated by an operator requesting an assignment or sublease will be payable to the Airport as additional rent. These amendments ensure Airport control of the use of airport properties and prevent current operators from receiving "windfall profits" from the sale of their leasehold with Airport participation.

One of the provisions of Council Motion 9523, adopted in April 1995, is that the Executive should explore new mitigation language to address current and future environmental issues including noise, traffic, surface and groundwater, and safety issues. Analysis has been conducted into this issue and some federal obstacles identified. For such language to be incorporated into these documents further work will need to be done. Certain operators have made voluntary mitigation payments; mitigation payment allowances, up to a 50% credit against applicable mitigation payments, have in these cases been permitted for operator expenditures for the mitigation of existing impacts. (see paper on this topic and summary here).

Lease, Operating Agreement and other standard airport legal documents need to be reviewed continually to ensure compliance with all new state and federal requirements.

7.2 OTHER ADMINISTRATIVE CONDITIONS (TO BE ADDED)

8 OPPORTUNITIES

8.1 SUMMARY

King County International Airport has many strategic advantages relating to its location and existing facilities. The following summarizes these opportunities and points to how the Strategic Master Plan may be able to capitalize on them.

8.2 FACILITIES OPPORTUNITIES

The existence of a 10,000 foot primary runway means that KCIA can serve almost any type of aircraft in the world. The only exception may be trans-Pacific cargo flights where gross takeoff weight and fuel are at maximum and a runway of 12,000 feet might be needed.***(TRA -- the demand capacity did not say this but isn't it true?)***

The presence of a short (3,710') general aviation parallel runway greatly increases the airport's operational capacity by providing for parallel operations and separation of small and large aircraft, enhancing safety. The opportunity exists, in terms of the short runway's capacity, to serve more of the small aircraft market.

There's potential for an increase in existing property utilization through the redevelopment and reconfiguration of airport properties. While no properties other than the EMF site are vacant, some key properties such as Hangars 3 / 4 will become available for a new lease in the near future.

The public use terminal area could be more intensely utilized. The large amount of underutilized space in the old and new terminal buildings represents a substantial opportunity for new uses and perhaps even new building sites, depending on the market mix of the selected airport Plan.

Aggressive planning will ensure that all needed facilities are identified and included in the development program. New infrastructure technology (e.g. fiber optics, telecommunications) could be utilized in the facilities development process to increase the attractiveness of KCIA. These facility improvements could be marketed to prospective tenants in terms of competitive edge and long-term cost savings.

King County itself owns a number of buildings on and adjacent to the field. As well as affording a revenue stream to the airport from private tenants, these properties, particularly those not actually on the field (and thus best used for aviation) represent an opportunity for County agencies which may have a particular need for this type of location to be economically housed. The airport's adequate free parking makes use of such space more convenient than the downtown County buildings.

At this point, the airport has substantial cargo facilities in place, although little warehousing. These facilities, all on the east side of the field, together with the vacant EMF site, could represent a focus for the further development of cargo activity, resulting in the possibility of confining truck traffic to one relatively small portion of the airport's internal road system and offering ease of re-use if operators leave.

8.3 PHYSICAL LOCATION/CAPACITY OPPORTUNITIES

KCIA is located within 6 miles of downtown Seattle to the north. As a result, this urban environment is also an excellent location for corporate and private GA. KCIA is also of significant benefit to the community's hospitals for their medevac flights. It is able to be a virtually 100% GA reliever for Sea-Tac (which has only 3 GA based aircraft, all belonging to Weyerhaeuser) because of its location. Unlike many urban airport systems where the primary air carrier airport also handles considerable GA traffic, this means an opportunity for specialization. KCIA can focus on a completely different segment of the market than Sea-Tac.

KCIA is accessible to the heart of the Duwamish Industrial Area, placing it near many major manufacturing markets. As a result of this location in the largest industrial area of King County, there are relatively few noise-sensitive land uses in the industrial area near the airport.

8.4 Market Potential / Client Base Opportunities

King County and surrounding communities within the KCIA service area have experienced significant economic growth. This is partially due to Seattle's position in relation to the Pacific Rim and other world markets. The resulting healthy regional economy creates market potential in several airport markets, especially cargo and corporate activity. Analysis of world, national, and regional aviation trends shows several new and growing markets (e.g., recreation, cargo, industrial, passenger).

Boeing Field is the region's busiest general aviation airport, part of a regional system of 30 public use fields. As such, and given its location, it can specialize within the regional marketplace, and seek out its most appropriate customers. KCIA has the potential to selectively tap into these markets based on the County's chosen strategic direction for the airport. This is a very different situation than the stagnant or declining market context at the time of the 1986 Plan. The market analysis and "most likely' forecasts suggest a number of opportunities for KCIA over the 20 years of the Plan.

As one of three key Washington airports in the Boeing Company's system, KCIA provides the basis for thousands of jobs. Boeing generates the single largest revenue flow at the airport. Boeing's vitality in the world aircraft market means that this role can be enhanced and continued with confidence into the future. KCIA has the potential to build a stronger synergy with the Boeing Company regarding the development and use of facilities, land use planning, and addressing other issues of common interest. Aerospace production is expected to increase during the Plan's timeframe, likely causing a more intense use of the Boeing leasehold.

With the role of other airports in the area more focused on smaller aircraft, KCIA's location, facilities and capacity offer the opportunity to accommodate critical larger components of the region's aviation demand. Nevertheless, the closure of several GA airports in the past 10 years together with a rebounding of GA activity, has led to stronger demands at KCIA for space by smaller aircraft. The opportunity is still strong to continue serving smaller operators. While personal / recreational flying will not in crease as fast as corporate GA, it still has some potential to grow at KCIA, and it seems likely that aircraft under 12,500 pounds will continue to dominate the based aircraft fleet, if not the flight operations, over the next 20 years.

Larger corporate operations and rotorcraft activity may be expected to continue to show strong demand resulting in a potential desire for more dedicated space. This is a result of national trends to higher use of business flying as well as relating to KCIA's excellent location for national and international business flying purposes.

Fixed Base Operator (FBO) activity will continue to grow in step with growth of its customer base and a choice of service provider can be supported by the level sales that can be expected.

KCIA continues to serve as a weather alternate for Sea-Tac, although to a lesser degree as improved instrumentation at SEA reduces the annual number of weather diversions. This shift frees some airspace capacity for other uses.

With the possibility of convenient sea-air, rail-air and highway-air transportation options and nearby connections to the regional highway system, KCIA has the potential to capture a larger share of the region's rapidly-growing air cargo market. In addition, the County's status as an "international gateway" places KCIA in a position to tap directly into the growing cargo market, both domestic and international, if it so desires. Air cargo growth in tonnage and number of carriers has been strong and may be expected to continue as national and northwest trends are in the same direction of high growth. Military flying is expected to stay at the same low level over the planning period. Passenger activity could have the potential to increase, under certain conditions but those conditions could be difficult to meet.

8.5 ECONOMIC / JOBS CREATION AND COMMUNITY - BUILDING OPPORTUNITIES

(note to readers: the off-airport land use and environs material is not yet complete in Section 5.9 of this paper, so not all of the following is supported yet)

Significant economic development and job creation (including incubator programs), could potentially be achieved by seeking new tenants able to generate large numbers of jobs and related economic benefits to the region. The opportunity and interest have been identified in creating stronger links between airport employers and educational institutions in the region and especially in the vicinity of the airport.

KCIA's strategic location provides for an opportunity to develop a Foreign Trade Zone or a sub-Zone of the existing Port of Seattle Zone.

While economic and population growth are faster in the other counties in the region, King County continues to dominate in terms of total income earning ability and income levels, meaning that jobs created via the airport can potentially be higher-paying than in other parts of the region.

The airport has long been a part of the Georgetown and Duwamish communities and has evolved harmoniously with its neighbors. As efforts are made to gain more value out of the region's existing industrial areas, the airport has the opportunity to strengthen its community ties and benefits, for example by focusing on jobs creation programs for local youth.

The airport has the need and opportunity to systematically and comprehensively address airport noise through a variety of monitoring, operations and land use programs.

KCIA has the opportunity to develop a more public education and recreational aviation services and facilities on the field. These could tie into the Boeing Company and the Pacific Museum of Flight; this would build good will and provide the public with a tool to become educated on

KCIA's economic impact, historical and growing future role in the community/region, and its unique role in the region's aviation system.

There is significant opportunity for KCIA to strengthen its connections with the community through a strong public involvement program, joint planning and development efforts with the Duwamish Coalition, proactively addressing airport noise issues, and implementation of proposed airport "rehabilitation" programs (facilities, graphics, environmental, etc.).

As compared to a private airport with similar customers, ownership of the airport by County government provides a mechanism for pursuing broad-based public policies in airport utilization, such as trade development and jobs creation, as well as placing strong emphasis on being a good neighbor through noise mitigation policies and programs as well as creation of an attractive interface between the neighborhoods and the Field.

KCIA, as a regional facility, has the opportunity to lead the way in developing formal relationships with other local governments, and coordinate on economic development and land use plans.

8.6 Environmental Opportunities

Growth opportunities should be combined at KCIA with appropriate cleanup actions to achieve cost effective and progressive environmental clean-up as well as concurrent development of public amenities.

As new developments and tenant leases are developed, KCIA has been using this as an opportunity to identify and negotiate restrictions on aircraft noise-generating activities. This approach could be strengthened and addressed through the development approval process e.g. lease revisions; new local ordinances or state legislation a noise monitoring program; and a variety of noise mitigation and abatement measures.

While not necessarily limited to this Plan, the planning process focuses an opportunity to implement a new administrative program to keep up to date on changing environmental regulations, at both the State and Federal level, regarding air and water quality. Such a program could identify new regulations that must be considered and could identify additional funding sources available for implementation such as Department of Ecology and EPA grants, and responsible party contributions.

The County rather than the local municipalities within which the airport lies, owns the water lines and other utilities that traverse the airport. This provides the opportunity for a greater measure of internal consistency and control.

8.8 Financial Opportunities

The Strategic Master Plan's timing is fortunate in being able to coincide with the required three-year reappraisal of airport property. This means that the revenue base for the Master Plan will be able to assume new land lease rates. This is important since this revenue source constitutes 85% of the airport's revenue.

There is revenue-producing opportunity for KCIA through increases to existing lease rates but also through more consistent application of fees and charges, and through possible development of new categories of fees such as mitigation fees. Additional revenue would allow expedited development to stimulate economic growth and provide needed funds for airport maintenance.

8.9 Other Fees And Their Applications

As discussed in Section 5, a possible new type of fee would be a mitigation fee that would collect funds for the added environmental impacts of a new airport activity.

8.10.1 Other Possible New Fees (TO BE ADDED)

8.10.2 Revenue Forecasts (TO BE ADDED)

8.11 Airport Administrative/ Service / Leasing/Land Use Opportunities

The Strategic Plan is an opportunity to identify systems for more efficient and effective airport development and operation, to enhance the airport's value to King County, increase revenues, and promote tenant responsibility (e.g. environmental compliance).

There is an opportunity to improve the homogeneity of airport sub-areas and create some differentiation based on usage zones and / or height restrictions. New land use rules for KCIA identified in the Plan would help King County enhance airport productivity while still protecting smaller users (e.g. recreational, small business GA).

9. CONSTRAINTS AND NEEDS

9.1 INTRODUCTION

A variety of constraints will affect alternatives reviewed and recommendations made in the Plan. Some constraints, such as the fact that the airport lies in a valley bounded by a river and railroad tracks on the west and east, and hills on the north and south, place distinct limits on what can be done. Others are needs that can be addressed during the 20-year planning period.

The following narrative discusses constraints and needs under much the same headings as opportunities were discussed, and seeks to make clear which are needs that the Plan should address, as opposed to fixed constraints.

9.2 FACILITIES DEVELOPMENT AND INFRASTRUCTURAL CONSTRAINTS AND NEEDS

KCIA's airfield pavements need maintenance; a well-defined and funded maintenance program has been created and must be kept current to protect the airport and continue eligibility for Federal funding (per new FAA pavement maintenance program requirements). One of the related needs the Plan must address is the viability of providing pavement maintenance services to tenants, on a fee basis.

The airport-operated tiedowns have about a 25 per cent vacancy rate, which is both an opportunity for small aircraft owners and, coupled with almost 100 names on the hangar waiting list, an indication that there could be an unmet need for covered aircraft storage.

In order to meet future demand as well as continue in providing safe facilities to current customers, certain elements of KCIA's aging airport infrastructure will in many cases require costly upgrades. For example, a 1940's era water line under the main runway needs investigation and probable replacement as the runway was lengthened over it in subsequent decades and its condition (other than age) is unknown. Airport facilities dependent on or near to this infrastructure will experience disruption during such improvements.

There is the potential for an airport-wide fiberoptic system, extending the existing fiberoptics LAN now in place between the airport's ARFF, Maintenance Shop and Administrative offices.

The terminal area has its own set of needs, that include the need for a decision how to use the Arrivals Building site and whether to replace it with another use /facility. The Plan will also address how to make fuller and more attractive use of the Old Terminal (the 1928 portion). Another need is to ensure that scarce rampside space is used only by customers that require ramp access.

There is a need to make fullest possible use of sites with less height restriction in this widest portion of the whole airport. It is desirable to create and maintain a welcoming "gateway" through aesthetic and other changes. There should be creation of a policy and mechanism to support community needs and interests without generating a problem of diversion of aviation funds to non-aviation uses banned by FAA. Last but not least, there is a need to create and sustain an appropriate level and variety of food service.

Ground access and parking needs include addressing the growing shortage of employee parking on the east side of the field and in the terminal area, particularly as cargo operations grow, which use large amounts of part-time labor. The east side also needs a truck route access system with wider roads and clear signage.

Using the multi-modal transportation available in the KCIA area, facilities could be developed to improve the Airport's links between the rail, highway, and marine systems.

The airport as a whole is in the process of improving its address signage but may need better road and highway access signs.

Needs in the perimeter zone relate to access gates and security systems; completeness of perimeter fencing; interfacing with Boeing to ensure a consistent access policy, and improved signage.

In addition, the airfield (and the Duwamish corridor in general) face potentially large environmental clean-up and reconstruction costs, such as asbestos removal and soils remediation, as part of the redevelopment process. The conversion of old and unusable buildings may also be very costly, given the potential need for major utility upgrades and environmental clean-up programs.

The growing number of based aircraft may require that additional wash pads be added as development occurs to ensure compliance with environmental requirements.

In addition, there may be a need to develop off-airport property to relocate non-aviation businesses now on the field, as demand grows for aviation land, and for related activities that benefit from airport access, but do not require airport locations (e.g., processing facilities for companies that fly parts in or out; air cargo sorting facilities; etc.).

9.3 Airspace Capacity / Obstruction-Related Constraints and Needs

KCIA's proximity to Sea-Tac (SEA) and also to Renton Municipal Airport imposes airspace constraints/conflicts. Congestion and costly delays result during instrument weather when capacity for SEA and KCIA is reduced to nearly that of a "single" runway There is a need to work closely with FAA in developing alternative airport futures and their possible implications for airspace capacity. There is also a need for ongoing communication with FAA as operations grow, in order to avert unexpected airspace crises.

In addition, its proximity to Sea-Tac and Renton Airports and the obstructions in the area constrain the airfield's potential to increase capacity and enhance existing instrument approaches. There may be a need for a new precision approach to the main runway, from the south.

There is a need for a fuller understanding of Sea-Tac's proposed third runway and how it would affect KCIA operations in north flow Instrument Meteorological Conditions (IMC). While it is doubtful whether the Master Plan can alter these implications, they should be addressed in the same timeframe as the Master Plan.

Other obstructions (penetrations to the FAR Part 77 airspace surfaces) also exist to the north of the airport. Other than hills, the most significant obstruction is the Georgetown Steam Plant - its removal is probably not cost-effective even if there were a way to satisfy the needs of historic and community interest groups. There is a need to work with the community and the building owner to find the highest and best use for this facility and site.

The presence of a number of residential areas near KCIA results in a need for noise abatement methods, particularly those which can create a more favorable noise climate for residents of the area without reducing operator access levels or flexibility.

9.4 Land Availability Constraints and Needs

KCIA's small site and lack of available vacant land mean that new development must be very carefully phased so that it doesn't adversely affect other uses. This typically translates to higher development costs and longer completion timeframes. The Plan must allow for this.

Land use needs also relate to making better use, over time, of all available parcels and establishing areas of like use to the fullest extent possible. The development of homogenous activity areas within the field is a need that the Plan must address.

Another need is to ensure that operators and tenants with a requirement for active ramp area access get precedence for scarce rampside sites, over tenants who need ramp access rarely or not at all. The airport Plan needs to set a long range policy on this issue. This was also mentioned in relation to the terminal area, but is an issue airport-wide.

Lease terms are set long for the benefit of lessors and their lenders. Airport management needs lease terms to be shorter as the aviation market becomes more volatile. The Plan should address lease policy in this regard.

The financial plan must take into account realistic costs for any future land. The Airport may need to acquire new land, within the 20-year timeframe of the Plan, to provide rampside access for aviation tenants. While such prospective sites are quite limited, the Plan needs to examine the potential and merits of each.

Since KCIA is a land-constrained site, King County could acquire land for off-site facility development to accommodate/ relocate current KCIA tenants which are not airfield "users". This would allow more efficient/ productive land use on-airport. In addition, off-airport property could be developed for related activities that benefit from airport access, but do not require airport locations (e.g., processing facilities for companies that fly parts in or out; air cargo sorting facilities; etc.).

9.5 Market Constraints and Needs

KCIA cannot always respond to market opportunities when they occur. KCIA has had to turn away potential new corporate, cargo and passenger tenants due to lack of readily available sites and facilities.

A cargo-related market issue is how to allocate scarce ramp space for aircraft parking at peak cargo operational times of the day, week and year, as well as how to develop and enforce "bumping" procedures when cargo operators are using the public ramp.

A general aviation market issue is fundamental – how to keep facilities and space available to small operators in the face of growing competition from larger operators. Another such issue is

how the airport can foster a multiplicity of Fixed Base Operators to ensure competition and choice of services to all users.

KCIA is highly dependent on one primary tenant; this could mean a significant negative impact on KCIA if that tenant encountered economic/financial hardship. The airport might benefit by expanding its markets and diversifying its tenant base.

9.7 Environmental Constraints and Needs

The airport's single most significant environmental issue is noise. Aircraft noise is inevitable at any airport; however, as the fleet mix changes to more jets and larger aircraft, the impact is more pronounced. The airport needs a comprehensive noise remedies program based on noise monitoring.

Through each redevelopment and lease/operating change, KCIA has the legal obligation and the need to implement environmental clean-up programs for contaminated sites, pollution prevention upgrades, and environmentally appropriate operating practices. An area-wide consent decree negotiated with state and federal agencies on such matters as cleanup standards, potable water standards and the like, and an environmental compliance Plan could be appropriate tools to initiate implementation.

Another possible constraint is the presence of documented historic buildings on the field. Restoration of any historic buildings must meet specific requirements. Such buildings are fixed constraints in the airport's future land use, since they cannot be removed without showing that no responsible alternatives exist. Additional historic resources may exist that have not been documented.

The potential for uncovering soil and groundwater contamination during redevelopment may constrain development initiatives. The airport needs an enforcement program to ensure that aircraft washing and de-icing are performed at wash pads and deicing locations. More

information is needed from Boeing about the surface water analyses they have been conducting on their own behalf.

There is a need for more comprehensive information about hazardous materials within County buildings on the airport, as well as in private buildings where the County is the landlord.

Airport growth could generate more surface traffic, creating congestion and the need for additional roadway improvements and demand management / trip reduction programs. Traffic access to the airport may need better freeway links and volumes, especially of truck traffic, may increase, requiring local on and off-airport road improvements in pavement, and in the case of Airport Way, in drainage also.

Air quality concerns have arisen and need addressing; localized "hot spots" from runups and takeoffs exist that are challenging to remedy and need further investigation.

9.8 Financial Constraints and Needs

KCIA has insufficient annual revenue to meet anticipated future demands. Also, at the federal level, the funding picture has changed substantially. Where in the past, airports could count on 90% federal funding for eligible major projects, today the whole future of the Airport Improvement Fund is in questioning addition, sinking funds for capital costs and to stabilize annual maintenance costs are needed.

The economic trend toward increased land and operations cost naturally creates pressure to increase rents and other airport rates and charges. These trends have historically resulted in the elimination of "lower end" GA. If the Plan recommends retaining this sector of the GA market, the County would likely need to set aside height-restricted and perhaps other areas to accommodate these users. The County may also need to acknowledge the limited uses for these sites in the form of lower rates and charges.

9.9 AIRPORT ADMINISTRATIVE/ LEASING CONSTRAINTS AND NEEDS

Insufficient flexibility in long-term leases has led to the County's inability to respond as airport needs change. This short-term constraint could be addressed in the plan through development of different lease strategies.

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[1] *Seattle's Role in Pacific Corporate Operations:* Business & Commercial Aviation, March 1996.

[2] *Business Aircraft in the International World:* Business & Commercial Aviation, December 1995.

[3] To Be Added

[4] Sea-Tac has IFR weather 24% of the time whereas KCIA is in IFR only 15% of the time, according to the KCIA tower.

[5] "Most Likely" Aviation Demand Forecasts, Technical Paper, TRA-BV, October 1996.

[6]

[7] For more detailed information about this survey, please refer to the Financial Profile of Regional and National Airports and Cost Comparison Analysis.

[8] Non-airline revenues are credited against costs to determine the net revenues required from airline rates and charges.

[999] Rates and charges are calculated to fully recover operating and capital costs.